

THE INSECT PEST SURVEY
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INTRODUCTION

The winter of 1936-37 resembled the preceding year in spectacular weather. December was wet and warm. In January extremes in temperature occurred in different sections of the country, being from 10° to 14° above normal east of the Mississippi River and from 10° to 20° colder than normal in the West. The month was abnormally wet over the eastern half of the country, the heavier rains culminating in the Ohio Valley, whereas it was relatively dry in the West, except in the Great Basin and in central California.

February weather, as a whole, registered near normal, being a little warm in the Lake Region and the Northeast and a little colder than normal in the West. Precipitation was abnormally heavy from the Rocky Mountains westward and in North Dakota, South Dakota, Minnesota, Wisconsin, and the extreme Southeast; elsewhere the rainfall was deficient. In March the situation in regard to temperature was reversed but rainfall continued the same, being abundant in the West and deficient in the East.

Temperature in April averaged remarkably near normal everywhere. Precipitation was above normal generally in the East and in the far Northwest, while a large area in the Southwest and much of the western plains had very little rain.

May as a whole was warmer than usual, but in the Ohio Valley and the Lake States the weather was abnormally cold, which, accompanied by rainfall, had an important bearing on insect abundance in these areas. Rainfall was below normal over much of the country, although some scattered States had more than normal.

In June the weather was decidedly cool during the first half and abnormally warm the latter half. Rainfall was above normal generally in most sections.

July had moderate temperatures over the Southern and Eastern States, abnormally warm weather in Central and northern Midwestern States. The rainfall was variable, with a tendency to dryness generally east of the Rockies but comparatively heavy from eastern Montana and Wyoming southwestward, where in some localities it was four times the normal amount.

August was abnormally warm except in the Pacific Northwest, where it was 2° cooler than normal. Precipitation was from moderate to heavy over much of the eastern part of the country, although there were local areas where rainfall was deficient, especially in the central part of the Mississippi Valley and the western part of the Ohio Valley. Rainfall was markedly deficient in most parts from the central and southwestern Great Plains to the Pacific, but in the Pacific Northwest it was well above normal.

September and October were cooler than normal east of the Mississippi Valley, particularly in the Ohio Valley and some Middle Atlantic sections, while it was warmer than usual generally west of the Mississippi. Precipitation in September was variable, being excessive in some places and deficient in others. Precipitation in October was heavy east of the Mississippi, some sections having from two to three times the normal amount. West of the Mississippi the distribution of rainfall was irregular, with a general tendency to dryness.

The effect of climatic conditions on insect development became evident the middle of December, when the fall cankerworm was observed mating on Long Island. Other examples of occurrences somewhat spectacular, although of no real importance, were grasshoppers hopping about in New Hampshire the third week in February, activity of moths in the northeastern part of the country all winter during the milder periods, and the hatching of eggs of the eastern tent caterpillar in southeastern New York late in February. In the Southern States many species of insects continued uninterrupted reproduction and others came out of hibernation and fed from time to time. The tomato pinworm passed the winter out of doors in the Philadelphia area; however, there were no reports of infestation in the summer.

The cool, rainy weather in April and May had an important effect on abundance of the chinch bug in the eastern part of its range. Emergence from hibernation was delayed and when the bugs came out they either died or failed to reproduce to any great extent. In the western part of their range, however, the weather was drier and damage was caused in some localities. Weather conditions late in the summer and fall

were favorable to a decided recovery of chinch bug populations from the spring set-back.

On the whole, grasshoppers were favored, by the weather. Although the cool, rainy spring in some parts of the infested area prolonged the hatching period and retarded nymphal development, it also interfered with the baiting program. Severe infestations occurred in all of the infested area. Rainfall during the summer was sufficient to produce more ample vegetation than in the preceding dry years; consequently, the effect of grasshopper feeding on crops was, in general, less concentrated and less severe. Abundant food, together with the unusual warmth from late in the summer until late in the fall, prolonged grasshopper activities and enabled Melanoplus mexicanus Sauss. to produce a partial second generation in the West Central and Rocky Mountain States. The eggs laid by this generation materially increased the population in prospect for 1938.

INSECT PESTS

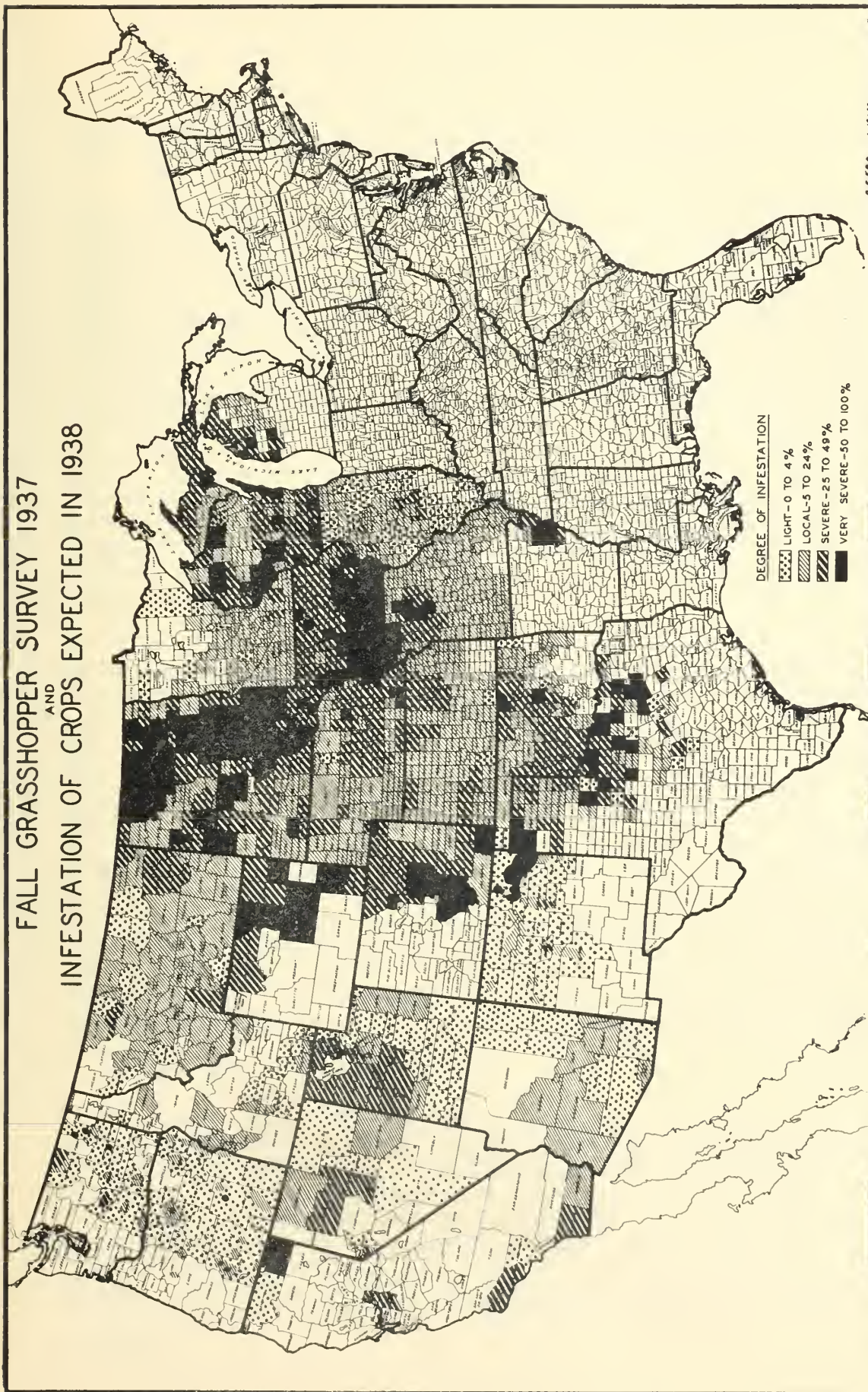
GRASSHOPPERS

In Michigan, Illinois, Missouri, Arkansas, and Texas and in all of the States west of these, grasshopper infestations were from light to very severe during the summer. The most severe and widespread damage was done to small grains in eight counties in the northeastern quarter of South Dakota and to crop and range grasses throughout the southeastern quarter of Colorado. Severe damage was done to cotton in Texas and Oklahoma, and spotted but severe injury occurred in corn, alfalfa, and small grains in other States. Over the entire area the total crop loss was between one-half and one-third of the loss in 1936. A few States outside of this area, including Indiana, Tennessee, Alabama, Mississippi, and Florida, reported increased numbers of grasshoppers or minor outbreaks.

In the great spring- and winter-sheep areas of the Plains States Melanoplus mexicanus Sauss. was by far the most important species. In areas of greater rainfall, in the Corn Belt, and where farming is more diversified, other species such as M. differentialis Thos., M. bivittatus Say, and M. femur-rubrum Deg., equalled or outnumbered M. mexicanus in many places. Camnula pellucida Scudd. was dominant in northern Michigan and Wisconsin and in parts of Oregon and California. In many parts of the area M. packardii Scudd. was also recorded as being numerous and important. For the first time in history, M. differentialis was dominant in Richland County, in the eastern part of Montana. Before 1932 there had been no record of this species in the State. It spread from the southwestern quarter of North Dakota east of the Badlands, where it was numerous in 1931, 1932, and 1933.

Another important feature of the outbreaks during the last 4 years has been the increase in numbers and importance of M. femur-rubrum in practically all of the States and the development of this species in a specific area embracing north-central and northeastern Iowa, south-central and southeastern Minnesota, the southern half of Wisconsin, and part of northern Illinois. A spectacular feature was the outbreak of Dissosteira longipennis Thos. in southeastern Colorado, the extreme western part of Kansas, the Panhandle of Oklahoma, the northwestern counties of the Panhandle of Texas, and the extreme northeastern counties of New Mexico. This year occurred the worst outbreak in the history of the area and the almost complete destruction of small grains by M. mexicanus in the eight counties in northeastern South Dakota, after the fall survey in 1936 had indicated that there would be little trouble from grasshoppers in 1937. If more stops had been

FALL GRASSHOPPER SURVEY 1937 AND INFESTATION OF CROPS EXPECTED IN 1938



made in each of these counties during the survey the scattered but dense infestations would no doubt have been picked up.

There was some hatching of M. mexicanus and M. bivittatus before May 1, and as early as February 15 in southern Arizona. In many areas spring rains and cool weather delayed hatching from 2 to 3 weeks. M. differentialis and M. femur-rubrum were from 2 to 3 weeks later in hatching than were M. mexicanus and M. bivittatus. Over the entire area the hatching of eggs of several species was prolonged in many localities up to the middle of July or the first of August. In Colorado and elsewhere D. longipennis started hatching the second week in May. Late hatching of some species in parts of the area delayed the necessity of control campaigns into the latter part of July. This was caused by cool rainy weather in June and July. Ninety percent of the poisoned bait used in Minnesota was put out after July 26. Over the entire area early rains delayed grasshopper activity. In general, first injury began after the middle of May and the worst damage occurred in June to small grains and to alfalfa after the first cutting, also to seedling alfalfa. Damage to corn came later in July.

A nymphal survey in May and June showed newly hatched nymphs to be congregated in restricted areas. On the range in Colorado the third week of May, D. longipennis was in areas of 40 to 320 acres, at the rate of from 50 to 500 hoppers per square foot. They were in the first instar and were already migrating and spreading. The last week of May heavy concentrations of M. mexicanus and M. bivittatus occurred in alfalfa, draws, pasture, creek bottoms, stubble, and field margins. Some of these concentrations ran from 300 to 500 per square yard. At this time there had been no general movement of these species to other crops from the breeding grounds. In South Dakota only 1 out of 5 to 10 fields near Huron were at first involved, because the infestations were spotted. At the beginning well-tilled fields were free from hoppers. These spotted infestations were so dense that their spread took in a wide area adjacent to their original hatching ground. One quarter-section of seedling alfalfa in this area had a population of 250 per square yard all over the field. This infestation alone could have taken all of the grain in 8 or 10 sections.

In both the Huron and Winner areas of South Dakota many of the grassy headlands suitable for egg deposition of M. differentialis and M. bivittatus had been covered by blown soil and changed to hummocks of sandy loam, covered with Russian-thistle, a condition well suited for egg deposition by M. mexicanus, and in these places this species hatched in considerable numbers. An environment suitable to certain species had been changed to one suitable to another species. Most of the grain fields destroyed in the eight counties in South Dakota started blowing as soon as the hoppers had taken off the grain.

A period of cold rainy weather during the first 3 weeks of June retarded nymphal development and in northern Iowa, northern Montana, northern and northeastern Wyoming, and elsewhere destroyed from 25 to 50 percent of the newly hatched nymphs. It also delayed and seriously interfered with the baiting programs. Prolonged hatching aggravates the situation by increasing the number of applications necessary. In some instances first-instar hoppers of M. mexicanus were found together in the same field with the gravid females.

The first record of adults was from southwestern Oklahoma, where 50 percent of the M. mexicanus were adult by May 22. Oviposition started July 1, which permitted a second generation of this species to begin hatching on July 20, with adults appearing again on September 1. Egg deposition by this second generation began on September 20 and continued into November. In South Dakota, Nebraska, Kansas, Oklahoma, Missouri, and Iowa, this second generation occurred at the rate of 15 to 100 per square yard in alfalfa and stubble and along field margins. These infestations actually developed into secondary outbreaks, being especially injurious to winter wheat and necessitating control measures to protect crops.

By June 20 there were a few adults of M. bivittatus together with all instars, but M. differentialis and M. femur-rubrum were still in the first three instars. M. bivittatus started ovipositing after July 15 and M. differentialis about September 1. From then on until the middle of November there was an almost unbroken favorable period for egg deposition in most of the grasshopper area. There was also plenty of green food for the development of eggs within the females. During the summer there were fewer flights recorded than in 1936, which was probably due to the cooler weather and better food conditions. In the D. longipennis areas this species was migrating by foot or wing from hatching until the females had settled down to egg deposition. This involved some 3 or 4 million acres in Colorado alone. M. mexicanus spread over 33 counties east of the Missouri River in South Dakota from the 3 counties and local infestations; however, most of the migrations were from breeding grounds to adjacent crop.

Generally speaking, disease, parasites, and egg predators did not reduce populations to any great degree during the summer. In some areas sarcophagid flies were a minor factor. During the egg survey bee fly, blister beetle, and carabid larvae were numerous, attacking from 40 to 70 percent of the egg pods in some places in Missouri, Iowa, and Minnesota. Fungus disease occurred only occasionally.

Eggs of all species were, in general, easily found and were well distributed over the entire area last fall. In Montana, Wyoming, Illinois, Kansas, and Nebraska infestations are equal to or slightly less than last year. In many of the other States infestations are

more widespread and more severe than they have been for several years. They have increased in northern Michigan, throughout Wisconsin, and in the southern half of Minnesota. The most severe infestations were found in Iowa, in northern Missouri, and east of the Missouri River in North Dakota and South Dakota. Egg pods of M. differentialis numbered from 25 to 100 per square foot in many places in Iowa and Missouri.

One of the most startling facts was the finding of egg pods, mostly M. mexicanus, at every one of 266 stops made in 33 counties east of the Missouri River in South Dakota. At 264 stops 5 square-foot samples were taken from within the field, or 1,320 square-foot samples altogether. Egg pods were found in 1,238 of them, or 15 out of 16 square-foot samples contained egg pods. M. femur-rubrum ran from 4 or 5 pods per square foot in upland pastures to 6 or 8 in the bottomlands in southern Wisconsin.

Infestations are higher in the delta country of Arkansas, over most of Oklahoma, and in 60 to 80 counties in northwestern, northern, and central Texas. In northeastern New Mexico there are 400 or 500 egg beds of D. longipennis from 4 to 10 acres in size, with pods numbering 8 to 30 per square foot. The average infestation in Arizona is about the same as last year, although there have been shifts within the State.

In Colorado D. longipennis still commands the most interest. Last spring it was estimated that 3,400,000 acres in 8 counties were infested at hatching time. This fall it is estimated that there are 4,025,760 acres of breeding areas in 12 counties, only 4 of which were included in last year's egg beds. There are 8 new counties having infestations of D. longipennis and 4 of the counties infested last year are not listed this year. This was due to the great migrations of adults and the infested area is almost directly west of where D. longipennis hatched last spring. Other species are also abundant in the irrigated sections of the State.

Areas in Colorado infested with D. longipennis

County	<u>1937</u>	Acreage	County	<u>1938</u>	Acreage
Baca-----	:	700,000	Elbert-----	:	207,360
Bent-----	:	100,000	El Paso-----	:	768,000
Cheyenne-----	:	300,000	Pueblo-----	:	640,000
Kiowa-----	:	300,000	Huerfano-----	:	640,000
Kit Carson-----	:	100,000	Las Animas-----	:	1,000,000
Las Animas-----	:	1,000,000	Kiowa-----	:	64,000
Lincoln-----	:	800,000	Lincoln-----	:	256,000
Prowers-----	:	100,000	Crowley-----	:	134,000
:	:		Otero-----	:	250,000
:	:		Fremont-----	:	64,000
:	:		Custer-----	:	32,000
:	:		Bent-----	:	25,000
Total-----	:	3,400,000	Total-----	:	4,025,760

The adult grasshopper survey indicates that there will be some outbreaks in Idaho, Utah, and Washington. Grasshoppers are on the increase in widely separated parts of Oregon threatening serious damage in 1938. The egg survey in California indicated a material reduction of grasshoppers for the State as a whole from the numbers prevailing last year. Parasites have taken considerable toll of the grasshopper eggs.

Last summer and fall 80,000 tons of bait were used in all the States for grasshopper control. All indications from the fall survey point to the fact that there will be needed twice that much to protect crops from hoppers in all the States in 1938. (R. L. Shotwell, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

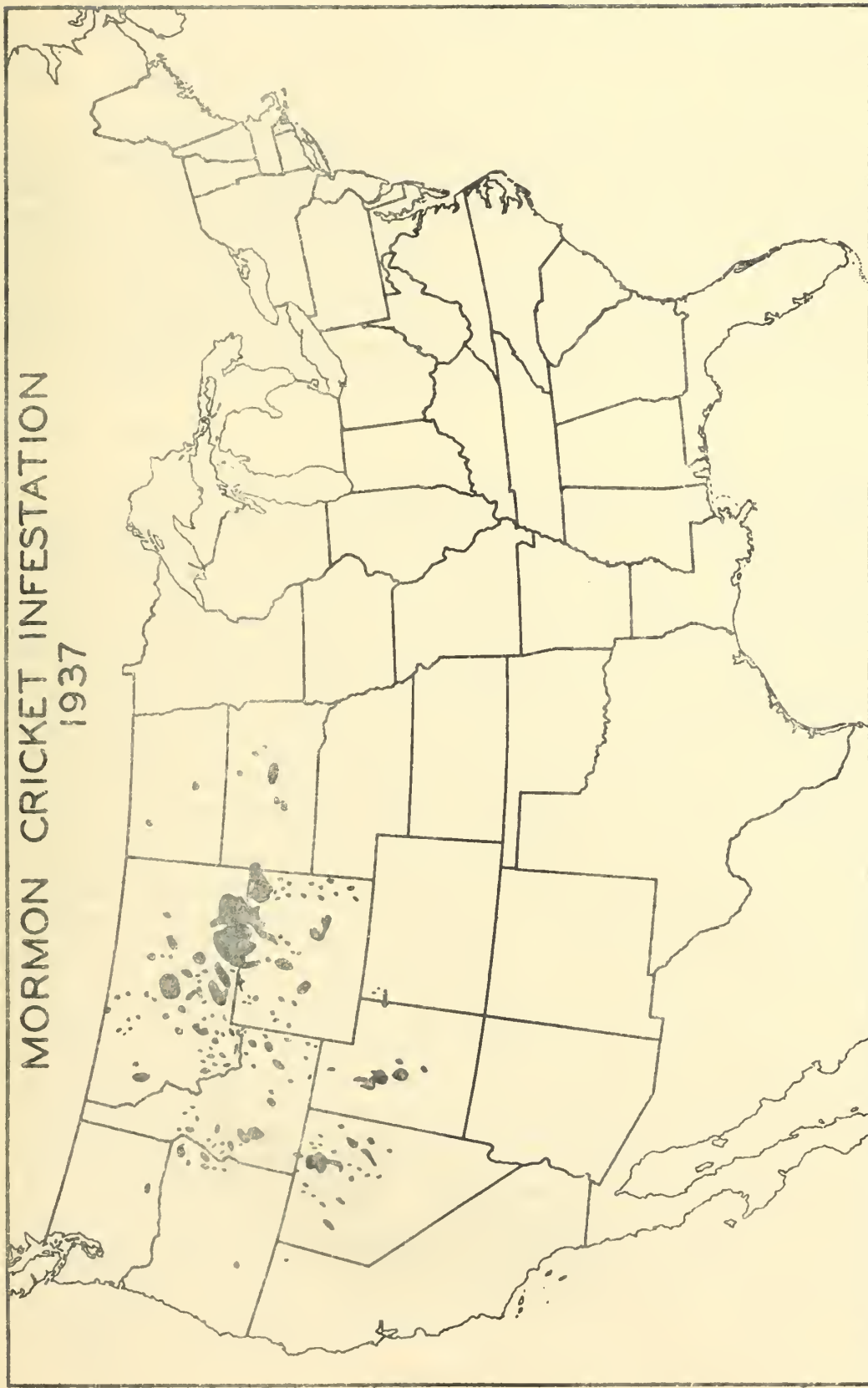
MORMON CRICKET

Mormon cricket infestations were reported for 1937 from 11 States, with a total of 19,273,242 acres in 105 counties, as follows:

State	Counties	Acres infested
	Number	Acres
California-----	1	?
Colorado-----	2	522,000
Idaho-----	17	1,046,229
Montana-----	39	7,487,695
North Dakota-----	5	?
Nevada-----	6	1,145,000
Oregon-----	3	230,000
South Dakota-----	9	5,700,000 ?
Utah-----	6	640,000
Washington-----	3	252,500
Wyoming-----	14	2,250,000
Total-----	105	19,273,424

Montana, with 39 infested counties out of a total of 56, showed the largest increase over 1936, but the 1937 outbreak in Wyoming was much more severe than that of 1936. Definite decreases in the size and intensity of outbreaks were noted in Colorado and eastern Idaho. Crickets were reported as doing damage to crops for the first time in North Dakota and South Dakota. These outbreaks are widely scattered at present and, although not serious now, may develop into serious proportions unless steps are taken to control them. In the remaining States that showed infestations in 1936 little or no change was noted in the size of the infestations, although the intensity was decreased somewhat in most States. No definite information was received from California this year, but it is understood

MORMON CRICKET INFESTATION
1937



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that crickets were present again in small numbers in Modoc County.

Crop losses were reported as follows: Idaho, slight; North Dakota, slight; Montana, \$500,550; Oregon, \$4,350; South Dakota, slight; Utah, \$10,000; Washington, \$50; Wyoming, \$250,873; making a total of \$898,621. Campaigns were conducted in Colorado, Montana, Oregon, Utah, Washington, and Wyoming under the direction of the Bureau of Entomology and Plant Quarantine and the cooperating States. State W. P. A. control projects were carried on in Idaho and Nevada. Reports from the 9 States indicate that it will be necessary to treat 454,500 "cricket acres" in 1938 in order to save crops. (F. T. Cowan, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

CHINCH BUG

Hibernating chinch bugs were present in moderate to very abundant numbers during the winter and spring of 1937 in an area extending from southeastern Nebraska and eastern Kansas, south to the Kansas-Oklahoma line, across southern Iowa and northern Missouri and the central part of Illinois into western Indiana. A generally lighter infested region extended around this area and included northeastern Oklahoma, southern Missouri, eastern Kansas, south-central Iowa, most of Illinois except the extreme northern and southern parts of the State, Indiana except the extreme southern part, and two-thirds of Ohio in the northwestern and central parts of the State. The extreme southern end of Michigan also came within this lighter infested area. Over most of this area winter mortality was more nearly normal, as opposed to the unusual, heavy mortality during the winter of 1935-36. However, a heavy winter mortality in southern Iowa was reported, which largely removed the rather threatening infestation in that area. Over most of the area spring was cool and wet, resulting in a gradual and delayed emergence from winter hibernation. This belated emergence, combined with the heavy rains in June and July, reduced the expected, rather generally moderate-to-heavy infestation to local, spotted outbreaks. The June and July rains were of more general distribution in most of Indiana and Ohio, therefore the infestation was reduced to a minimum in three States. Farther west from Illinois, across southern Iowa and Missouri into eastern Kansas and Oklahoma, the spring and summer rains were local. This caused some moderate-to-heavy infestation and corresponding injury to small grains and adjacent corn by the first-brood nymphs. These outbreaks were very spotted and local, covering in some cases half a county. Considerable damage by first-brood bugs was also reported from the north-central part of South Carolina and several localities in central and southern Mississippi. In most of the infested area the weather in late summer and fall was dry and favorable to the development of the second brood. This comeback of the second brood over much of the area resulted in some local damage to corn.

The extent of the moderate-to-heavy infested chinch bug area

seems, from available reports, to be from western Indiana across central Illinois, with the more generally and heavily infested area occupying the central part of the latter State, the southern two tiers of counties in Iowa, most of the northern part of Missouri, southeastern Nebraska, eastern Kansas and northeastern Oklahoma. There is some westward extension of the infested area in Kansas and southwest into central Oklahoma. There is a general increase in abundance of chinch bugs, especially in Oklahoma, where both the intensity and extent of the infestation is the most severe in several years. The infestation throughout most of the entire area is very spotted. This indicates the possibility of spotted local moderate-to-severe outbreaks occurring over the area, in case of favorable weather during the spring of 1938, with restricted slight-to-moderate outbreaks in case of unfavorable weather. This survey is based principally on data supplied by the State entomologists of the States concerned, and on supplementary data from the stations of the Bureau of Entomology and Plant Quarantine in the States. (C. Benton, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

HESSIAN FLY

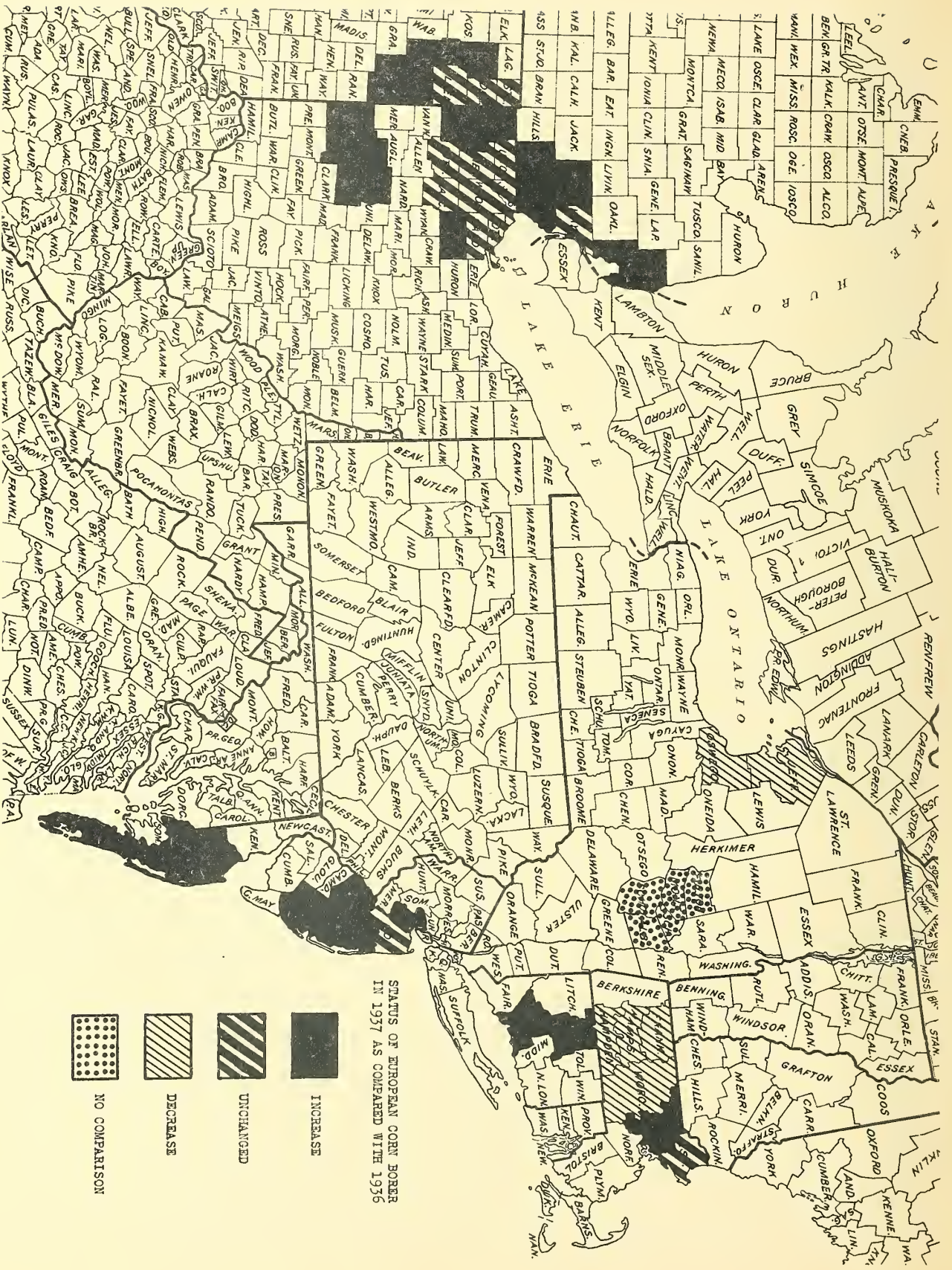
At harvest time infestations were extremely light in Nebraska, Kansas, and Oklahoma, and practically no material damage occurred. The same was generally true of Iowa, except the northeastern part, and of Missouri, northern Illinois, central and northeastern Indiana, Ohio, Kentucky, Tennessee, western and central Pennsylvania, Maryland, Delaware, Virginia, and North Carolina. In these States, however, certain scattered fields contained enough infestation to be a possible source of local trouble in the fall of 1937. The fly was unusually abundant in some of the more northern parts of its range, including northeastern Iowa, southern Wisconsin, and south-central Michigan. Other areas containing moderate-to-severe infestation, in which there was real danger of an outbreak if weather should favor fly activity, were southern Illinois, northwestern and southern Indiana, and southeastern Pennsylvania.

There was some volunteer wheat in southeastern Pennsylvania and southern Missouri, in which small supplementary broods of fly developed and emerged to infest sown wheat. Throughout the remainder of the area under consideration there was not much growth of volunteer, owing to unfavorable weather.

In Nebraska, Kansas, Missouri, north of the Missouri River, and Oklahoma fall infestations appeared to be generally light and scattered. In eastern Pennsylvania, northwestern Ohio, Iowa, and in Missouri south of the Missouri River, the fly seems to be increasing in abundance.

More than the usual amount of early sowing was done in





STATUS OF EUROPEAN CORN BOER
 IN 1937 AS COMPARED WITH 1936

eastern Pennsylvania, Ohio, southern Michigan, central and northern Indiana, western Illinois, and southern Missouri. Some of these early sown fields show infestations ranging from 20 to 100 percent of the plants. In most cases this does not indicate a really serious situation and damage will probably be restricted to local areas. (W. B. Noble, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

EUROPEAN CORN BORER

Comparative data on the abundance of the European corn borer in 1937 in different sections of the area infested were obtained in a survey conducted from August 16 to October 1. In the surveyed portions of Michigan, Indiana, and Ohio, the borer was as generally distributed and as abundant in 1937 as in any previous year of record. Within the territory surveyed in these States in 1937, comprised of 18 counties and 4 county groups, there were 9 counties and 3 county groups in which populations increased significantly from 1936 to 1937, and 9 counties and 1 county group in which the abundance of the borer changed little in the same 2 years. Significant decreases were absent. Damage to early sweet corn grown near Toledo, Ohio, in 1937 reached economic importance.

Although the weather of the 1937 season in the surveyed parts of the above region was considered generally more favorable to the European corn borer than that of any recent year, its effects were offset to some extent by the prevalence of late corn and by severe rain and wind storms in some sections at crucial periods of larval establishment. In New York there was a decrease in abundance in 1937 over that of 1936 in the Jefferson-Oswego County group, whereas in the Albany district approximately the same number of borers were present in 1937 as were found in the last survey, made in 1935.

Along the Atlantic coast, the borer increased in abundance in 1937 over 1936 in a portion of eastern Massachusetts, in central Connecticut, in southeastern New Jersey, in southern Delaware, and on the Eastern Shore of Maryland and Virginia. The only exception to an increase or tendency in that direction was in western Massachusetts, where a significant decrease in borer population was shown by the survey. The heaviest populations found in 1937, or in any other year of survey in the United States, occurred in Hartford and New Haven Counties, Conn. The general increase in abundance along the Atlantic coast in 1937 was undoubtedly due to favorable weather, particularly the absence of drought. A partial second generation of the corn borer continued to occur in Michigan, Ohio, and Indiana, and was particularly noticeable in early sweet corn near Toledo, Ohio. (W. A. Baker, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

ARMYWORM

The armyworm was the outstanding insect pest in the Mississippi, Arkansas, and Ohio River Valleys in May and June. The outbreak

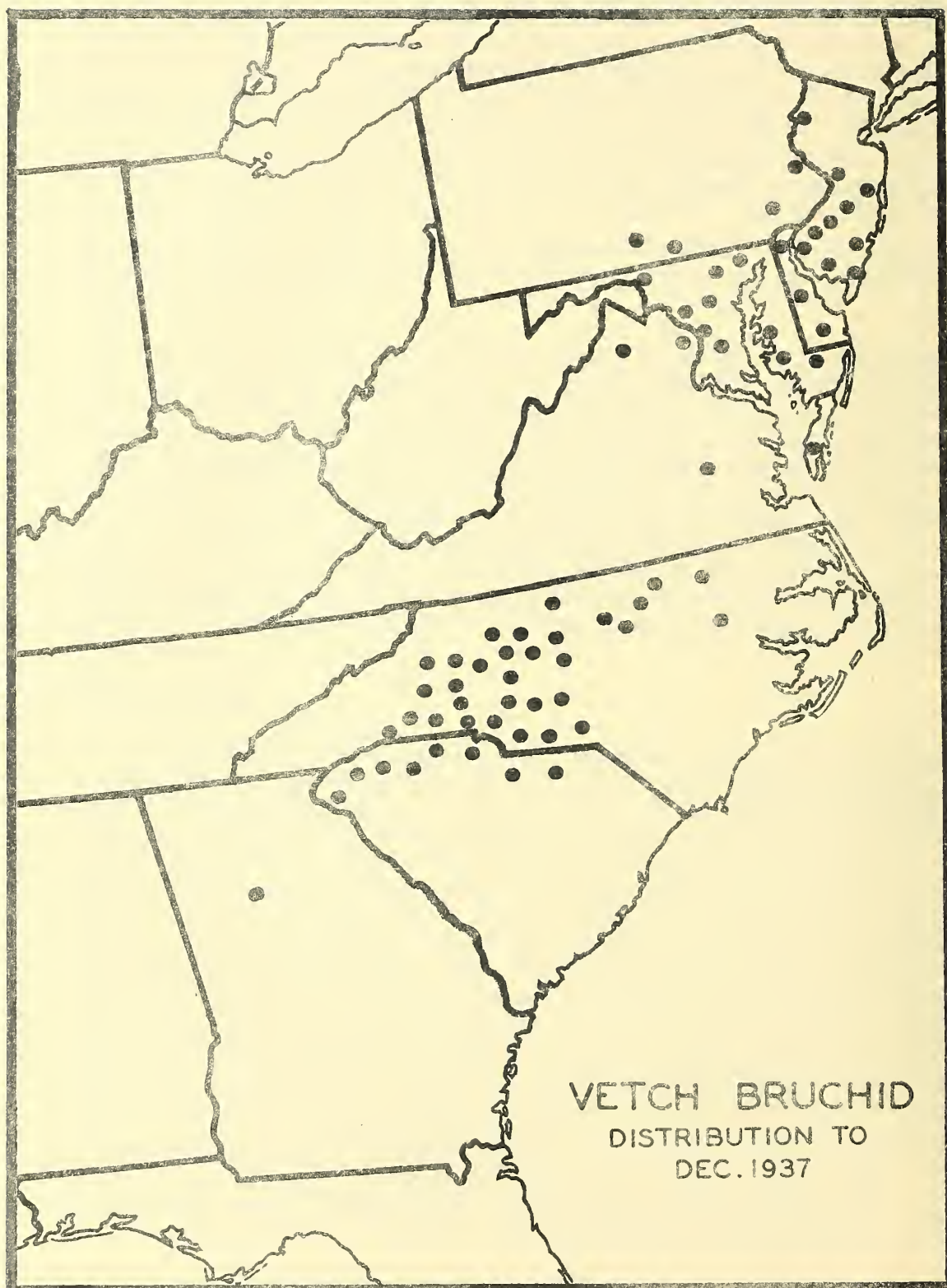
developed the first week in May in northwestern Mississippi, east-central Arkansas, and northeastern Louisiana. Some injury extended later into northern Texas and central and northeastern Oklahoma. The pest spread northeastward, causing severe injury to small grains, grasses, corn, and alfalfa in the southeastern half of Missouri, the southern three-fourths of Illinois, the southern half of Indiana and western and central Kentucky. The infestation extended from the above-mentioned area of severe injury into eastern Kansas, throughout Iowa into southern Minnesota, Wisconsin, and Michigan, and into Ohio and

western New York. Small isolated outbreaks occurred in central Arizona, in Richland County in east-central Montana, and in southeastern North Dakota.

Along the Atlantic coast the insect occurred in destructive abundance in scattered localities in North Carolina, in the Norfolk district of Virginia, and on the Eastern Shore of Virginia and Maryland in June and damage was reported northward, reaching Maine the first week in August, when caterpillars were severely damaging oats and grasses in the central part of the State. This is the first time the insect has been reported in outbreak numbers in Maine for several years. A heavy flight of moths was reported from southern California and caterpillars were found attacking cotton in Kern County. A single specimen was taken in northern Florida, and moths were collected at lights in south-central Georgia. These States are rarely infested by armyworm.

CORN EAR WORM

The corn ear worm emerged from hibernation in great abundance and started its attack early. The mild winter probably permitted the insect to live over farther north than usual, as reports were received early in the season of severe injury to tomato and early sweet corn in the Southern States, northward to a line from northern Delaware to central Illinois. Early reports of serious damage to tomato in greenhouses in Ohio and Illinois were also received. This type of injury usually occurs late in the fall. As the season progressed, reports of serious injury to sweet corn were received from the entire eastern half of the country. An estimate of 50 percent infestation in extra early sweet corn in southern Connecticut was reported in July. Moths were observed in abundance in Maine, but no larval injury was reported. While early reports indicated that this year would be one of record-breaking abundance of this pest, for some reason increase in populations diminished materially by midseason. Field corn probably was not injured more than normally; however, the late crops of sweet corn were heavily infested. Considerable injury to late sweet corn occurred in southern Minnesota. Chrysanthemums were damaged in Wisconsin, as were peanuts in Oklahoma and gladiolus in Florida.



VETCH BRUCHID
DISTRIBUTION TO
DEC. 1937

WEBWORMS

The garden webworm occurred in outbreak numbers over the southeastern quarter of Nebraska, the eastern half of Kansas, over much of Oklahoma, and into northern and central Texas. The infestation also followed the Missouri River into central Missouri. The area of heaviest infestation centered in Oklahoma. Alfalfa was the principal crop attacked and corn, cotton, and garden crops were also damaged. An isolated point of infestation also occurred in northern Indiana and southwestern Michigan, where alfalfa was severely attacked, seedlings especially being destroyed.

The beet webworm was very abundant from southern and southeastern Idaho southward to southern Utah, and extended eastward into western Wyoming where the insect rarely becomes of economic importance. Isolated areas of infestation also occurred in northern Idaho, west-central Montana, and eastern North Dakota. Sugar beets, alfalfa, and truck crops were damaged.

VETCH BRUCHID

The vetch bruchid began emerging from hibernation quarters in North Carolina in April, the first adult being taken on the 17th. They were present in all vetch fields by the 1st of May, and the peak of overwintering adults in the field was reached on May 19. The abundance of adults was about the same as during the last 2 years. The weevil population, however, in this year's crop of seed is much lower than during the two previous seasons. The maximum infestation found was 65 percent, with a minimum of 9 percent, and an average of about 30 percent. The average infestation for the last 2 years has been 50 percent. Two factors seemed to have caused this condition, the rapid maturity of the crop and the fact that many of the pods set earliest, which received most of the egg deposition, failed to mature and produce seed. Most of the infested seed that came to the cleaning mills contained dead forms of various stages of the weevil and produced few living adults. One factor responsible for this was the rapid hardening of the seed this year, which caused the death of many first-, second-, and third-instar larvae through their inability to consume the hardened material. Many of the advanced stages were also found dead. This condition has not been noticed in previous observations.

During the course of the year the known distribution was increased by eight counties in three States as follows: Adams County, Pa.; Burke, Caldwell, Edgecombe, Halifax, Rutherford, and Polk Counties, N. C.; and York County, S. C. The attached map gives the known distribution in this country to date.

Collections of bruchid-infested seed were gathered in North

Carolina and in Pennsylvania during the summer and placed in rearing boxes for issuance of parasites. No new parasites were reared from the North Carolina material. From the material collected in Pennsylvania two parasites, Dibrachys cavus (Walk.) and Habrolepoidea tarsalis Gir., heretofore not known to attack this insect, were reared. Two new localities were listed for the European chalcid Bruchobius mayri Masi, which was reared for the first time in this country last year from material collected in Rowan County, N. C. Material collected in Iredell County, N. C., produced specimens of this parasite, and many specimens also issued from the material collected in the Adama County, Pa., bruchid infestation discovered last summer. In July one release of Trichogramma and several releases of Triaspis thoracicus Curt. were made at Arendtsville, Pa. One adult of T. thoracicus has been reared from the bruchid in collections made in the area of release. (I. S. Pinckney, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

ALFALFA WEEVIL

On the basis of the 1936 fall survey, severe and general damage by the weevil in 1937 was expected only in Mesa County, Colo., where three-fourths of the fields had threatening populations. One-fourth of the fields were menaced in the upper Snake River Valley of eastern Idaho, in Jackson County, Oreg., in Delta and Montrose Counties of western Colorado, in Douglas County, Nev., and in Sanpete County, Utah, while damage to 10-20 percent of the fields was indicated in Box Elder, Salt Lake, and Sevier Counties, Utah, and in Washoe County, Nev. Slight-to-negligible damage was expected in the lower Snake River Valley of western Idaho, eastern Oregon, Eagle Valley in Baker County, Oreg., and in Churchill County, Nev. General economic damage actually developed only in Douglas County, Nev., and Millard County, Utah, where the first crop was severely damaged in 50 percent of the fields. In Delta County, Colo., and in Eagle Valley of Baker County, Oreg., economic loss was light, although 25 and 35 percent of the fields, respectively, changed color, the injury being limited to tips of plants. Washoe County, Nev., Jackson County, Oreg., and Bonneville and Bingham Counties of eastern Idaho experienced light injury in 10 percent of the fields. In the following districts 5 percent of the fields developed light injury: Box Elder, Salt Lake, and Sanpete Counties, Utah, Jefferson, Madison, and Fremont Counties, Idaho, and Mesa and Montrose Counties, Colo. The damage was negligible in the remaining counties in Utah and Oregon, all of western Idaho, western Nebraska, eastern Wyoming, and the infested lowland district of central California. In Douglas County, Nev., the injury indicated by the fall survey was approximately 25 percent of the fields, but severe injury developed in 50 percent of them, the injury being mostly on large acreages where proper cutting could not be practiced. This injury was to some extent exaggerated by old, thin stands and poor growth. In Mesa County, Colo., on the contrary, where 75-percent

● WHITE-FRINGED
NAUPACTUS BEETLE
○ NAUPACTUS LEUCOLOMA
SP.



damage of the fields was expected only 5 percent were injured. This reduction was due primarily to heavy winter mortality and partly to unfavorable dry spring conditions. Millard County, Utah, was not surveyed but experienced severe damage to 50 percent of the fields. This is a seed district where the practices necessary to seed production always result in building up large adult populations by greatly delayed cutting of the second (seed) crop.

The 1937 fall survey shows that weevil populations have increased generally throughout the infested territory since 1936. The most important exception is Sioux County, Nebr., where the population has fallen to negligible proportions following return to more nearly normal weather conditions. Most severe damage for next year is indicated in Mesa and Delta Counties, Colo., Box Elder County, Utah, and Jackson County, Oreg., where from one-third to one-half of the fields have threatening adult populations. Approximately from one-fourth to one-third of the fields are menaced in Salt Lake and Sanpete Counties, Utah, the several counties constituting the upper Snake River Valley of eastern Idaho, Eagle Valley in Baker County, Oreg., and Douglas and Washoe Counties in western Nevada. One-tenth or less of the fields are threatened with damage in 1938 in Sevier County, Utah, the lower Snake River Valley in western Idaho and eastern Oregon, Churchill County, Nev., and Montrose County, Colo. This outlook is, of course, subject to modification by weather conditions during winter and spring.

Scouting during the summer of 1937 yielded new records of infestation in six counties located in three States, namely, Campbell, Johnson, Sheridan, and Weston Counties, Wyo., Custer County, S. D., and Modoc County, Calif., the last discovery having been made by representatives of the California State department of agriculture. (J. C. Hamlin, W. C. McDuffie, and R. W. Bunn, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

WHITE-FRINGED BEETLE

The white-fringed beetle (Naupactus leucoloma Boh.), a newly introduced pest which was first reported from this country in July 1936, appeared in great numbers in Walton and Okaloosa Counties, Fla., and in Covington County, Ala., in July 1937. Scouting in 1937 revealed that the infestation in southern Alabama and northwestern Florida covered approximately 27 square miles and involved parts of Covington and Geneva Counties, Ala., and Walton and Okaloosa Counties, Fla. Minor infestations were found at Pensacola, Fla., Laurel, Miss., and New Orleans, La. The density of the population at these last-mentioned places was considerably less than in the area centered around Florala, Ala. In the Florala area the larvae destroyed from 10 to 90 percent of the stand of field crops over areas ranging in

size from a few square yards to 10 acres. In many instances where the stands were materially reduced and second plantings were made these were also destroyed. The principal crops thus far damaged have been peanuts, corn, cotton, velvetbeans, sweetpotatoes, and cowpeas, although this insect has been found to attack more than 50 plants. In July the population of adults in many of the heavily infested fields in the Florala area was more than 150,000 per acre. The larval population in 41 fields during November and December averaged 184 larvae per square yard, or at the rate of approximately 890,000 per acre. In the heaviest infested fields larval populations of more than 1,000 per square yard have been found.

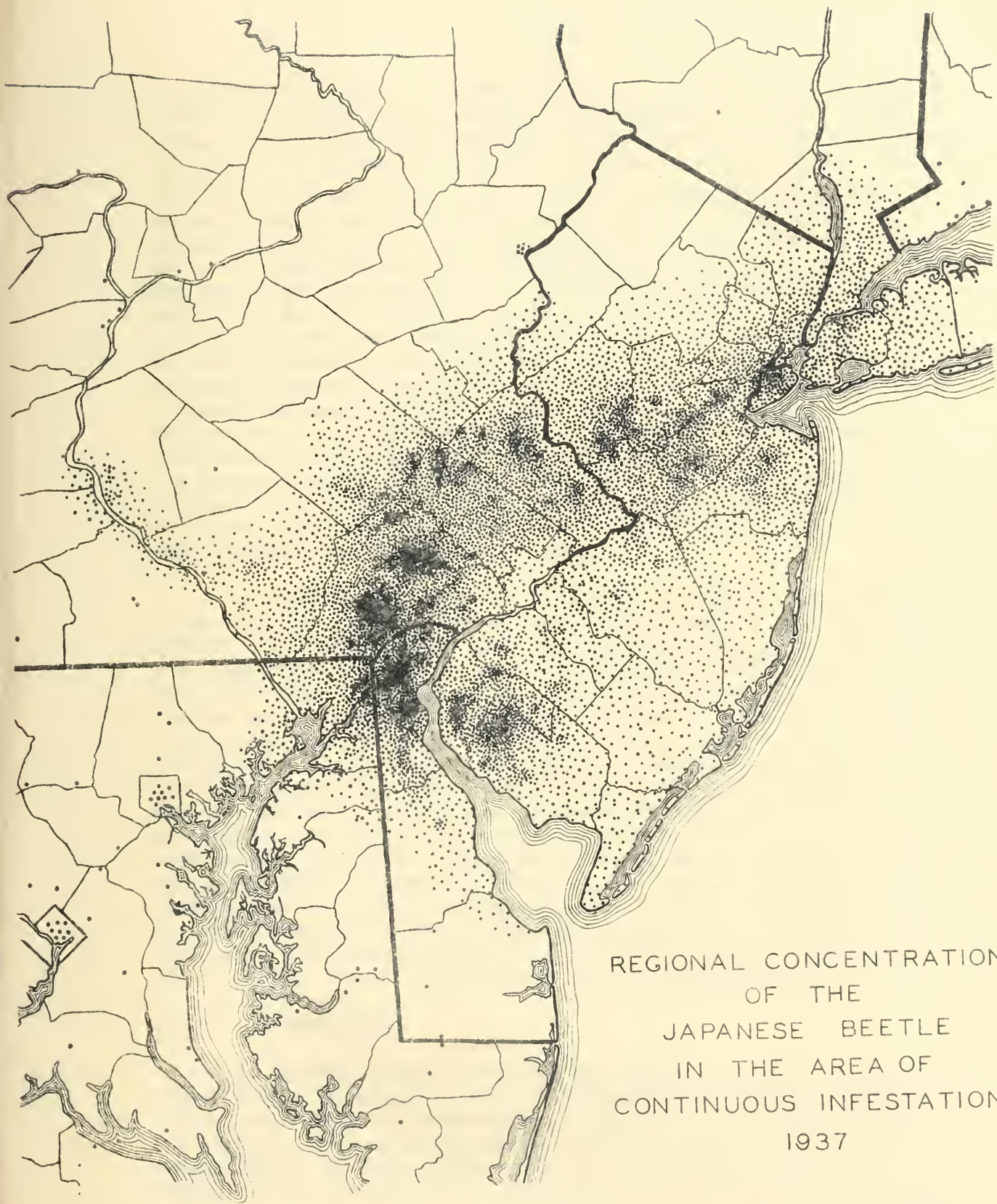
A new species of Naupactus was discovered in southern Mississippi in the vicinity of Gulfport. This species is known to occur in Harrison and Stone counties, Miss., for a distance of approximately 25 miles northward from the Gulf coast. The habits of this insect are very similar to those of the white-fringed beetle. (H. C. Young, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

CLOVER LEAF WEEVIL

The clover leaf weevil appeared early in May and in the next 6 weeks did considerable injury to clover and alfalfa from western Ohio and southwestern Michigan, southwestward through Indiana, Kentucky, Illinois, southeastern Iowa, Missouri, and northwestern Arkansas into central Kansas and Oklahoma. Evidently disease or weather conditions prevented a second generation, as no reports of injury in the fall were received.

JAPANESE BEETLE

Throughout the area of continuous infestation of the Japanese beetle, as shown by the accompanying map, the winter of 1936-37 was extremely mild and the winter mortality of the beetle was no higher than normal. Spring weather and soil conditions in general were favorable for larval and pupal development and adult emergence was normal as to rate and relative date. Throughout large sections of the area of continuous infestation a general reduction in the 1937 beetle population was observed. Drought conditions of varying intensity that characterized the summer of 1936 throughout the greater part of New Jersey, eastern Pennsylvania, and northern Delaware, appear to have been the dominant factor in this reduction in population. The decrease in infestation was general throughout New Jersey, eastern Pennsylvania, particularly north of the Schuylkill River, and in the Philadelphia area; however, substantial increases were recorded in the New York City metropolitan area and on western Long Island, while in most of the newly infested territory lying on the periphery of the area of continuous infestation the usual increase in beetle



REGIONAL CONCENTRATION
OF THE
JAPANESE BEETLE
IN THE AREA OF
CONTINUOUS INFESTATION
1937

abundance was observed. Infestations were severe enough to develop tree injury of varying intensity within an extensive tract roughly arcuate in outline, which occupied southwestern New Jersey, northern Delaware, the southeastern tier of counties in Pennsylvania, north-central New Jersey, and the adjacent New York metropolitan area. At the close of the 1937 beetle season the area continuously infested was estimated at 13,851 square miles, distributed as follows: Delaware, 946; Maryland, 664; Pennsylvania, 4,358; New Jersey, 6,980; New York, 858; Connecticut, 45. Moisture conditions on the whole during the fall of 1937 were favorable for the new brood throughout much of Delaware, eastern Pennsylvania, and north-central New Jersey, so that a partial return to former conditions of abundance can be reasonably expected during the coming year in areas that experienced a marked decrease during the current season. This expectation is substantiated by the increase in soil populations encountered in grub surveys at a number of locations during the fall. However, in New Jersey south of Trenton, together with the area adjacent to the Delaware River in Pennsylvania, moisture conditions were not so favorable, with the probability that the 1938 infestation will remain somewhere near the current level.

In the New England area, the winter of 1936-37 was likewise quite mild, and larval survival seemed to be normal. It was noted, however, at an observation point in the northern range of the beetle that eggs known to have entered the hibernating period did not survive the winter. At most of the established points of infestation, the beetle population was definitely greater in 1937 than in 1936, although at some points in the more northern range, there was but little, if any, appreciable increase. In Connecticut, where beetles have been present for many years, infestations are especially numerous and heavy, and in the southeastern corner of the State the infestation has now merged with and become part of the main area of continuous infestation. There was no deficiency of rainfall last summer and fall, therefore, conditions for the soil population were very favorable. Larval surveys at several points showed that more larvae entered the winter hibernation period in 1937 than in 1936, indicating a further increase in the beetle population next year. (C. H. Hadley, Bureau of Entomology and Plant Quarantine, U.S.D.A.)

ASIATIC GARDEN BEETLE

No general surveys have been made during the year to determine the spread or abundance of the Asiatic garden beetle, but observations made in July in northern New Jersey indicate a still further reduction in the beetle population, in comparison with that of preceding years. At the colony center in Philadelphia, similar reduction in beetles was noted, although new local infestations were noted at several points. A reduction in beetle population and feeding on favored food plants was also noted at the colony center at Riverton, N. J. (C. H. Hadley, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

CODLING MOTH

Over the country in general codling moth development seemed late in starting, with retardation early in the summer because of cool, moist weather, and more rapid increase with warm dry weather later. Heavier infestations than usual are reported from Massachusetts, Delaware, and New Jersey, and in parts of Virginia and West Virginia, near Winchester, Va. The species decreased somewhat from 1936 in other parts of Virginia, Pennsylvania, and New York, also in Ontario, South Carolina, and Georgia. Over a wide midwestern area a high initial infestation did not increase much because of cool wet weather early in the summer, but built up rapidly late in the summer and the final population was extremely heavy. This was true in Indiana, southern Michigan, Illinois, Missouri, and Kansas. In Wisconsin and Iowa considerable build-up late in the summer was noted. Kentucky reported the species more abundant. Arkansas and Oklahoma reported light variable infestation after a crop failure and Idaho a light infestation because of winter mortality. Washington had less codling moth than last year, with a cool damp season, but noted some late increase. In southern Oregon and northern California heavier infestations were reported. (F. M. Wadley, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

EASTERN TENT CATERPILLAR

The eastern tent caterpillar was reported as decreasing in the Middle Atlantic Sections, where it has been abundant for several years, and as very abundant in parts of New England and the western parts of New York and Pennsylvania. The decrease was noted in Delaware, New Jersey, eastern New York, southern and central Pennsylvania, and Connecticut. Heavy infestations were noted in Vermont, Rhode Island, Maine, Massachusetts, western New York, and northwestern Pennsylvania, with local outbreaks in parts of Connecticut, South Carolina, and Georgia. New Hampshire reported destruction of larvae by storms at hatching time. The species was reported also from Mississippi, Arkansas, Florida, North Carolina, Kentucky, and Tennessee. The variation in seasonal history, owing to latitude, is shown in progress of hatching, from mid-March in the South to late April in Maine. (F. M. Wadley, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

PLUM CURCULIO

On the whole this species caused little damage and attracted little attention in 1937. Activity began on dates varying from April 10 in Georgia to mid-May in New York and New England. The species was recorded as light or less than normal in Minnesota, Wisconsin, Missouri, Ohio, Delaware, Virginia, and Georgia. It

was reported without comparisons from Michigan, Nebraska, and Iowa. Abundance was rated as about normal in Massachusetts and most parts of New York, but heavier than usual in Maine and in eastern New York. Considerable abundance or injury was reported from spots in Mississippi, northeastern Texas, and Connecticut. (F. M. Wadley, Bureau of Entomology and Plant Quarantine) U. S. D. A.)

BEET LEAFHOPPER

The distribution of damage by the beet leafhopper during 1937 was very spotted. The spring migration occurred at about the normal time in all areas. Numbers were light to moderate in western Colorado, northern Utah, and California. Heavy migrations were received by the Sevier Valley in central Utah and by the Twin Falls area of southern Idaho. Only beets of varieties resistant to curly-top were planted in the last-named areas, but some damage was experienced, probably reducing yields from 1 to 3 tons per acre. In central California over 10,000 acres of resistant beets were planted in a new area, closely adjacent to the breeding grounds in the foothills. Weather conditions caused late planting, and most of the fields were severely damaged by curly-top. New plantings of beets in the Yakima Valley of Washington were damaged considerably by the leafhoppers from local breeding areas. No damage to beets in Montana or to spinach in Texas was reported this year. Tomatoes in central California were damaged more heavily this season than for the last three or four seasons. (W.C. Cook, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

PEA APHID

The pea aphid, although moderately abundant in 1937, in general did not occur in such numbers as were recorded during each of the last 3 or 4 years. Over much of its range the aphid appeared on peas rather late in the season, then increased in abundance very rapidly until some damage to peas resulted, only to decrease again in numbers before the end of the pea-harvesting season. This behavior was noted especially in New York, Indiana, Ohio, Illinois, Wisconsin, and Utah.

In the north-central section of the United States very few aphids were in evidence on either alfalfa or peas until after the middle of June. Before the first of July, however, infestation had increased to such an extent that control measures were necessary on most of the late pea acreage. In this north-central section aphids exhibited the unusual behavior of reaching a relatively low peak of population and then dispersing from peas in many instances before seriously injuring the crop and long before their food supply of green and succulent peas was exhausted.

Although predators, parasites, diseases, and, in some localities, adverse weather conditions are reported by various observers to have been responsible for the decrease in the abundance of the insect, it is believed that their diminishing numbers, in the north-central section at least, can be attributed to a pronounced reduction in the normal rate of reproduction rather than to the effect of natural enemies.

MEXICAN BEAN BEETLE

The year 1937 was about an average year for the Mexican bean beetle in the Eastern States, with the possible exception of the northern limit of its distribution. The high winter survival in many sections was probably offset by the smaller numbers entering hibernation in the fall of 1936. The beetle was more abundant in central and northern Ohio than usual, also in Massachusetts, Connecticut, New York, New Jersey, Delaware, and northern Indiana.

At Columbus, Ohio, the survival in the spring of 1937 was the highest of record. An average of 45.5 percent of the beetles placed in hibernation cages in the fall of 1936 survived and emerged in the spring of 1937. At Beltsville, Md., 63.6 percent survived; at Mappsville, Va., 25.65 percent; and at Clemson College, S. C., 50.26 percent. In the Ohio River Valley survival was high but beetles were not so numerous early in the spring as in some years, probably because fewer beetles entered hibernation in the fall.

In southern Ohio reproduction was rapid, causing large populations, but a summer drought slowed up reproduction and in the fall fewer beetles were present than usual. In central Ohio populations were larger than usual. In many sections of the East and South reproduction was rapid and populations were large. At Grand Junction, Colo., the survival over winter was very low, less than 1 percent.

New records of distribution include Niagara County, N. Y.; Yalabusha County, Miss.; and Dale County, Ala. (N. F. Howard, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

TOMATO PINWORM

The cold spell of January 1937 materially reduced tomato pinworm survival and cold nights during the spring and early summer acted as a further check on pinworm build-up, as compared to that of 1936. Although various degrees of infestation could be found in all areas of southern California by July 1, actual commercial damage did not occur until the latter part of September. By that time the insect had built up in early tomato fields, or on tomato plants taken from infested seed beds, until from 25 to 50 percent of the fruit was

infested. Consequently, many late fields which were near early infested fields or which were started from infested seed beds became heavily infested (50 to 90% wormy fruit) by November 1. The Vista area of San Diego County, a small area near Riverside in Riverside County, several semifrostless areas of Orange County, and an upland area near San Fernando in Los Angeles County experienced this type of heavy damage in late tomato fields. In general, the lowland areas or the areas of a comparatively short tomato-growing season experienced little or no damage from pinworm attack. In the El Cajon Valley of San Diego County, where the tomato pinworm has caused serious losses to the large late tomato crop in the past, infestations were at a low point this year because small early plantings, on which the pinworm has usually built up, were entirely omitted. In the Simi and Santa Rosa Valleys of Ventura County, infestations in tomatoes ranged from a trace to 17 percent, with little commercial damage. The pinworm was not found in Santa Barbara and San Luis Obispo Counties. A survey made on November 15 to 20, revealed the presence of the tomato pinworm in the counties of Kern, Tulare, Fresno, Madera, Merced, Stanislaus, and Santa Clara. It had previously been reported from Santa Clara, Kern, Tulare, and Stanislaus Counties. In Merced, Madera, and Fresno Counties, from 80 to 90 percent of the fruit left on the vines in several fields was infested. (J. C. Elmore, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

Note.--The first report of the occurrence of the tomato pinworm in Arizona was made in June, when tomato fields northeast of Phoenix were found to be generally infested. The insect injured tomatoes in Manatee and Sarasota Counties, Fla., and a survey over the southern half of the peninsula disclosed general light infestations. Although a report on March 22, 1937, stated that the insect was living through the winter out of doors in the Philadelphia district, no reports of infestation were received during the summer and a report late in the season indicated that cooperative control had reduced the pest and that eradication is expected. The insect is believed to have been eradicated in Delaware.

CABBAGE WORMS

In the Charleston area some injury to the spring crop was noticeable at the end of the season. Although all species were present and increased in numbers rapidly as the season advanced, the cabbage looper was responsible for the greater part of the injury. The diamondback moth was next in importance but was not sufficiently abundant to cause economic injury. The imported cabbage worm was of no economic importance until the end of the season, when it was responsible for some injury. Summer surveys on available cruciferous plants indicated that cabbage loopers, diamondback moths, imported cabbage moths, several species of

Agrotinae, and webworms were present throughout the summer. Of these, the looper was the most abundant but the numbers of both loopers and imported cabbage worms decreased gradually toward the end of the summer. Diamondback moths were present in relatively small numbers and the Agrotinae and webworms were not conspicuous until early in the fall. The predominating species present on the fall crop were those of the Agrotinae, except during the latter part of the period when loopers predominated. Slight injury resulted from the presence of these species but cold weather in November definitely checked any further development. The diamondback moth and the imported cabbage worm were present but of no particular economic importance.

In Louisiana during the spring the populations of cabbage worms were below normal and infestations occurred only in isolated spots. There appeared to be an especially heavy parasitization of the imported cabbage worm. During the summer, loopers, diamondback moths, and cross-striped cabbage worms were present on cruciferous plants. Loopers predominated until September, when the imported cabbage worm increased to major proportions. The fall crop suffered but little from cabbage worms. Early in the season the imported cabbage worm was the predominating species but later the looper became most numerous. What appeared to be a rapid increase of diamondback moths was checked by cold weather late in November. (C. F. Stahl, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

VEGETABLE WEEVIL

During the winter and spring of 1936-37, the vegetable weevil was reported as doing more than the usual amount of damage in the Gulf coast territory and also in southern California. It was reported in destructive abundance for the first time in Florida. In This State it was also reported as damaging tobacco. This is the first record of its attacking this host plant in the U. S.

A WHITEFLY

A whitefly, Trialeurodes abutilonea Hald., was reported by H. G. Walker as occurring in injurious numbers on beans in Norfolk and Princess Anne Counties, Va., during the fall of 1937. This is the first report of this insect attacking beans.

TOBACCO FLEA BEETLE

The records obtained in 1937 showed that tobacco flea beetles were abundant in all of the principal tobacco-producing areas. This pest was destructive to newly set plants in South Carolina, North Carolina, Virginia, Maryland, Tennessee, and Kentucky. In North Carolina, South Carolina, and Virginia considerable damage was inflicted in plant beds and in many localities it was necessary to

replant fields of tobacco several times as a result of flea beetle attack on the newly set plants. The most severe outbreak reported occurred in western North Carolina, in Guilford, Forsyth, Stokes, Surry, Yadkin, Person, and Granville Counties.

The overwintered adults began activity in South Carolina tobacco districts on warm days in February and in North Carolina some activity was noted early in March. In studies made at Oxford, N. C., it was found that 24.1 percent of the overwintering flea beetles survived in cages located at the edge of a woods, while there was a survival of 33.6 percent in similar cages located from 6 to 8 feet within the woods. Samples taken nearby in the same woods indicated a survival under natural conditions of 17.1 percent. The first activity of this insect in Tennessee was reported on April 12.

Infestations in the cigar tobacco-producing districts of Florida and southern Georgia were much heavier in 1937 than in 1936. In Connecticut this insect was recorded as occurring sporadically and in small numbers on cigar tobacco. (W. D. Reed, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

POTATO FLEA BEETLE

This insect was unusually abundant in the cigar tobacco districts of the Connecticut River Valley and inflicted severe damage on newly set tobacco plants during June. Owing to control measures, the succeeding broods did not develop large populations in tobacco shades but normal populations developed in untreated fields of sun-grown cigar tobaccos. (W. D. Reed, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

HORNWORMS

Hornworms were more abundant in 1937 than in 1936 in all tobacco districts from which records were obtained and in many sections severe outbreaks occurred on tobacco. In the Florida and Georgia tobacco-producing areas the predominant species, Protoparce sexta Johan., began emergence about May 1. The first eggs and young larvae were collected from the field on May 8. Observations made in 1937 indicated that three generations of P. sexta developed in tobacco fields of this district during the year.

Both P. quinquemaculata Haw. and P. sexta appeared at about the same time in 1937 as in 1936 in the Bright-tobacco Belt, but the infestations were more severe in 1937. The first eggs were collected from tobacco fields in the vicinity of Oxford, N. C., on May 24 and at Florence, S. C., on May 13. The first adults captured with

traps located in the field in North Carolina were taken on May 27. The first moths emerged from hibernation cages located at Oxford on June 7. The damage from hornworms in North Carolina was widespread, especially in late tobacco. Both species appeared late in the season in destructive numbers on cigar tobaccos in the Connecticut River Valley. Earlier in the season P. sexta was more abundant, but later the numbers of P. quinquemaculata predominated. Considerable damage was recorded in fields and barns of late harvested tobacco.

Heavy parasitization on the late broods of larvae by Apanteles congregatus (Say) was recorded in North Carolina and Connecticut. (W. D. Reed, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

TOBACCO BUDWORM

Infestation of the tobacco budworm was general throughout the principal producing districts in 1937. The degree of infestation was about the same as for 1936 in the Florida and Georgia districts and in the Bright-tobacco Belt. In the Tennessee and Kentucky districts no unusual outbreaks were reported on Burley and dark fire-cured tobaccos. The only specimens observed in the Connecticut district were taken from potted tobacco plants located on the grounds of the Tobacco Experiment Station at Windsor. (W.D. Reed, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

TOBACCO THRIPS

This pest caused severe damage to shade-grown tobacco in the Florida district in 1936 but in 1937, owing apparently to abundant rainfall, little damage was reported. Damage to shade tobacco was reported from several districts in the Connecticut River Valley, the injury being more severe around edges of fields bordering on grassland. The commercial damage was observed to be less than in 1936 in tobacco shades, owing perhaps to the widespread use of dusts for controlling the potato flea beetle. (W. D. Reed, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

CIGARETTE BEETLE

Reports obtained from light traps operating in Virginia, North Carolina, New Jersey, New York, and Connecticut showed that the cigarette beetle was somewhat more abundant in tobacco factories and warehouses of stored tobacco in 1937 than in 1936. The spring brood of beetles began emergence in Virginia around May 8 and activity was noted in warehouses until about November 1. (W. D. Reed, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

TOBACCO MOTH

The populations of the tobacco moth were greater in 1937 than in 1936, especially in open warehouses of stored domestic cigarette tobaccos where no control measures were applied. Destructive infestations were recorded also in warehouses of imported cigarette tobaccos. The spring brood of moths began emergence around April 25 in the tobacco warehouses of Virginia and North Carolina and the heaviest damage was observed in open storage. (W. D. Reed, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BOLL WEEVIL

For the second consecutive year, the boll weevil damage over the greater part of the Cotton Belt was very light in 1937. The rather small number of weevils entering hibernation in the fall of 1936 were favored by mild winter temperatures which caused very low mortality. The survival in hibernation cages at Florence, S. C., equaled the previous high in 1933, while at Tallulah, La., and at College Station, Tex., it was the highest since 1932. Emergence continued over a longer period and later into the season than usual at Florence and Tallulah but was more nearly normal at College Station. As a result of the high survival, weevils were fairly abundant in the fields in the early part of 1937, notwithstanding the small numbers that entered hibernation the previous fall. However, the prospects for a year of normal or heavy weevil damage was changed by the hot and dry weather, which effectively checked weevil multiplication and damage, except in the States along the Atlantic seaboard and in eastern Texas. In these sections the damage was greater than it has been for several years, but in large areas in the central part of the belt damage was lighter and less insecticide was needed for control than in many years. Conditions were very favorable for cotton growth and the average yield per acre and total production for the United States were the highest ever recorded. During the latter part of the summer and fall abundant rains produced a large crop of late squares and bolls in which weevils multiplied rapidly and became very numerous before frost. The cotton leaf worm caused very little defoliation and conditions were favorable for higher than average numbers of well-fed weevils to enter hibernation. (U. C. Loftin, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

COTTON LEAF WORM

The first appearance of the cotton leaf worm in 1937 was reported by the experiment station entomologist from southern Texas on May 27--2 weeks later than last year. Spread was very slow and records of appearances in other areas were as follows: Port Lavaca, Tex., June 9; Gainesville, Fla., July 6; College Station, Tex., July 23; Presidio, Tex., July 24; Tallulah, La., August 7; Florence,

S. C. August 25; and Stoneville, Miss., September 4. Judging from the dates of observation, the moths apparently entered the United States in three areas--southern Texas, Florida, and the irrigated districts from western Texas to Arizona. Defoliation of cotton was very light and control was needed only on late plantings. (U. C. Loftin, Bureau of Entomology and Plant Quarantine, U. S. D.A.)

BOLLWORM

Emergence of bollworm moths in hibernation cages at College Station, Tex., was about 20 percent greater than in 1936. Eggs were not as abundant on corn early in the season as usual and oviposition on cotton in July was much lighter and the infestation was more spotted in Brazos and Burleson Counties, Tex., than in 1936. Very severe damage was caused to late-planted cotton in Calhoun, Jackson, and other southern Texas counties. More than average damage was also reported from southern Georgia and Florida, but on the whole there was less damage to cotton than normally. (U. C. Loftin, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BEET ARMYWORM

Outbreaks of the beet armyworm in the Salt River Valley of Arizona for the third consecutive year indicate that this species is becoming one of the major local pests of cotton. In 1937 the damage extended over a large area but was most severe in the Buckeye Valle, where several hundred acres of cotton had to be replanted. Injury consists of feeding on the leaves and terminal buds of the cotton seedlings and girdling of the stems near the surface of the ground, which causes either the death of the plants or the formation of plants with several stems and excessive branching. (T. P. Cassidy, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

COTTON FLEA HOPPER

The emergence of flea hoppers from overwintering eggs, as indicated in hibernation cages at Port Lavaca, Tex., was about normal in numbers though the peak of emergence was earlier than usual. During May and June, or the period of heaviest dispersal to cotton, the hopper population on cotton was greater than in 1936 but less than during the three preceding years. On the whole, damage was less than normal in southern Texas in 1937, although local areas experienced considerable injury. The comparatively light damage was influenced by the dry weather during April and May that caused a shortage of succulent weed host plants and insufficient moisture for maximum hatching of eggs. The population on cotton increased rapidly during the latter part of June, but by that time the early planted cotton had set a crop of large squares and bolls that were beyond the stage of flea hopper injury. Reports received from other sections indicated considerable damage in local areas of northern Georgia, but only light damage elsewhere. (U. C. Loftin, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

PERIODICAL CICADA

Brood XXIII, the most widespread of the 13-year race of the periodical cicada, appeared over most of the territory where it was expected.

Brood XI, belonging to the 17-year race, a small, isolated brood, which, it was feared, had become extinct as no record was made of its appearance in 1920, was reported in 1937 from one area of not more than 10 acres near East Willington, Tolland County, in north-central Connecticut.

Records of the occurrence of the insect in Perry County, Pa., and from Delaware, Erie, and Greene Counties, Ohio, cannot be definitely associated with either of the broods appearing this year.

The rest of the records of the year are being placed in Brood XXIII as follows, the counties being underscored:

Alabama:

Etowah, Gadsden; Lauderdale, Waterloo; Madison, between New Hope and Paint Creek.

Arkansas:

Arkansas; Clay; Craighead; Cross; Franklin; Jackson; Jefferson; Lawrence; Lee; Lincoln; Lonoke; Mississippi; Monroe; Prairie; Poinsett; Pulaski; Scott; Saint Francis; Washington; Woodruff.

Illinois:

Alexander; Pulaski; Union.

Indiana:

Knox, Vincennes; Sullivan, Shelburn.

Kansas:

Allen; Chautauqua, Peru; Douglas; Franklin; Montgomery, Caney, Coffeyville; Neosho; Shawnee.

Kentucky:

Ballard, Wickliffe, also most of the rest of the county; Bath, Owingsville; Bracken, Lenoxburg, Milford, Wellsburg; Butler, Quality; Calloway, over most of county in large numbers; Carlisle, along Mississippi River, later appeared over most of county; Edmonson, Chalybeate Springs; Elliott, a few observed on hilltops; Fulton, Hickman, Fulton; Grant, Williamstown; Graves, Cuba, Farmington, Mayfield, Pryorsburg; Grayson, Grayson Springs, Meredith, Falls of Rough; Hart, Munfordville;

Hickman, over entire county; Lyon, Popular Creek, Confederate;
Pendleton, Falmouth; Pike, Shelby Creek; Rowan, in small
numbers in every section of county; Warren, Rockland.

Louisiana:

Caldwell, Columbia, Crayson.

Mississippi:

Alcorn, Corinth; Chickasaw; George; Grenada, Grenada; Jackson;
Montgomery, Kilmichael; Newton, Decatur; Pike, Magnolia;
Pontotoc; Tippah; Tishomingo, Iuka; Wayne; Greene.

Missouri:

Douglas; Howell; Mississippi; Scott; Stoddard.

Ohio:

Butler, along Indian Creek; Hamilton, Mount Airy.

Tennessee:

Lauderdale; Shelby, Memphis; Tipton.

GYPSY MOTH

The hatch of gypsy moth egg clusters in the spring of 1937 was practically complete over the entire infested territory, owing to the fact that the winter of 1936-37 was very mild; hence, the exposed egg clusters were not subjected to extreme low temperatures. During the summer a total of 680,760 acres of woodland were partially or totally defoliated, this being over 50,000 acres more than any previous record of defoliation. In Maine, the areas of defoliation were much more extensive than in 1936 and likewise, much more extensive than have ever been recorded for that State. This increase was almost uniform throughout the infested territory, as much more extensive areas of defoliation were noted than ever before in all counties, with the exception of York, the most southern one. In New Hampshire areas of defoliation were less extensive than in 1936. In that State the total acreage recorded has been decreasing during the last 2 years. In Massachusetts more defoliation was recorded than ever before and there was a very marked increase from the records of 1936, the 1937 total being more than double that recorded for the previous year and nearly double the highest ever recorded. For most of the territory east of the Connecticut River, with the exception of the Cape Cod district, the increases in acreages of defoliation over 1936 were very marked and for most counties the totals were higher than ever recorded. While there was a slight increase in certain sections of Cape Cod, the defoliation in that section was nowhere near so extensive as has been recorded previously. For the territory immediately east of the Connecticut River the increase in size of areas

defoliated was particularly marked. In Rhode Island there was a slight decrease in extent of areas showing defoliation, while in Vermont and Connecticut defoliation was very light. (A. F. Burgess, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BROWN-TAIL MOTH

During the summer of 1937 there were no reports of extensive defoliation by the brown-tail moth. As a whole, the infestation over the entire area was light. The wholesale cutting of webs during the fall and winter of 1935-36 and 1936-37 helped greatly in reducing the infestation. During the fall and winter of 1936-37 a total of 743,610 winter webs were cut in Maine; 1,523,478 in New Hampshire; 3 in Vermont; 779,404 in Massachusetts; and 44 in Rhode Island, making a total of 3,046,539. (A. F. Burgess, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

SATIN MOTH

The satin moth seemed to be somewhat more noticeable in various sections of New England than in 1936, although no extensive areas of defoliation were noted in any locality. In Maine towns in the south and southwestern part were generally infested and some noticeable defoliation was noted in different sections of the infested area. In southeastern and central New Hampshire some of the towns were generally infested, but no heavy defoliation was noted. In Vermont some heavy defoliation was noted in the eastern part of the State along the Connecticut River. In Massachusetts heavy defoliation was noted in some sections of the State, several large Carolina poplars in Pittsfield and Provincetown being entirely defoliated. In Rhode Island the whole State was lightly infested, although several poplar trees in Barrington were noticeably defoliated. In Connecticut all towns east of the Connecticut River were lightly infested, although heavy defoliation was noted in New London. (A. F. Burgess, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

Defoliation by the satin moth in western Washington was negligible in 1937, probably as a result of the effective work of introduced parasites. However, at the southern extension of its range in the Willamette Valley of Oregon, heavy defoliation of white poplars was noted. (F. P. Keen, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

NATIVE ELM BARK BEETLE

The native elm bark beetle (Hylurgopinus rufipes Eich.) is not considered to be of as much importance in the spread of the Dutch elm disease fungus as is the smaller European elm bark

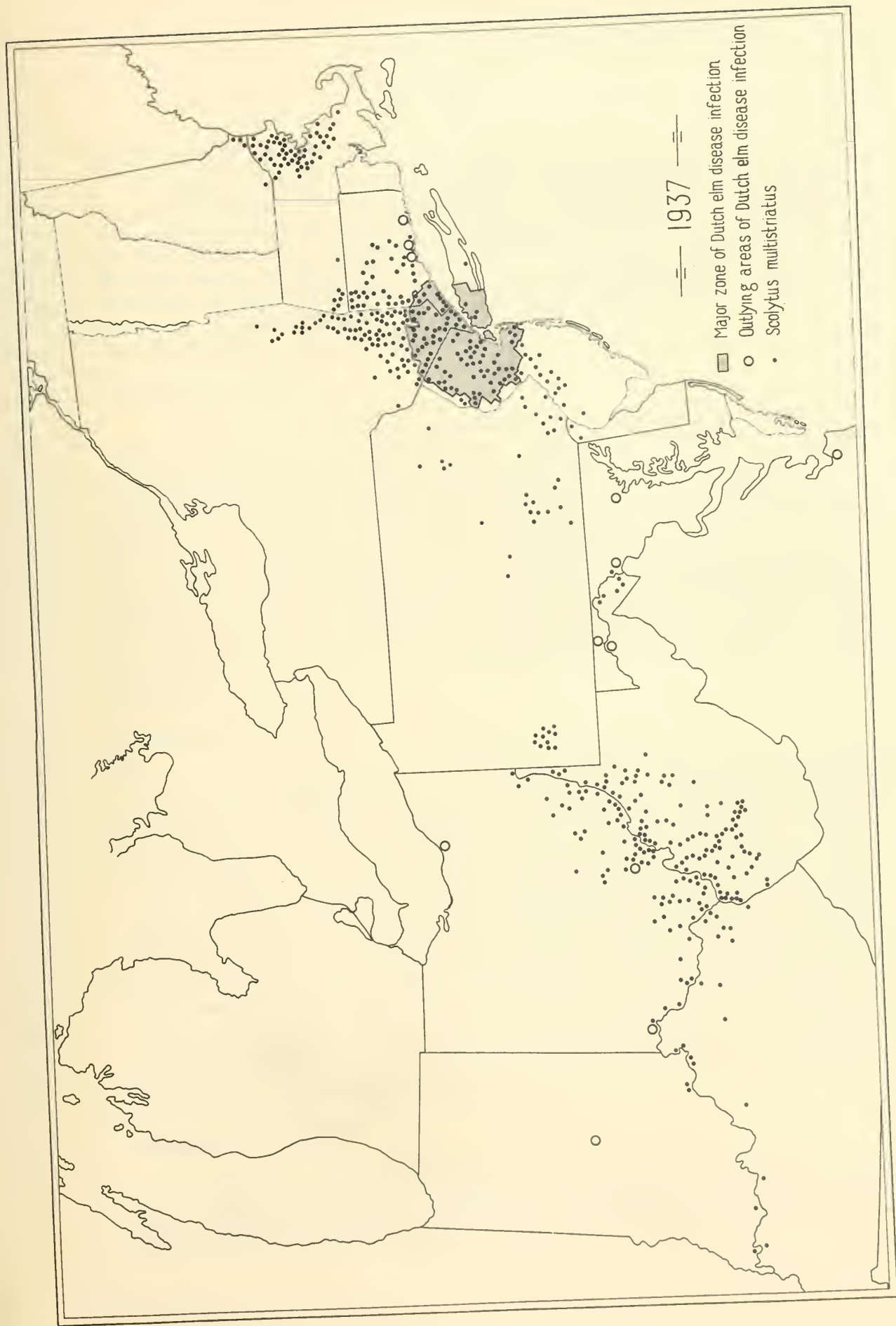
beetle (Scolytus multistriatus Marsh.). However, in obtaining distribution records of the latter species, attention has also been given to H. rufipes. We have many records of its occurrence in the eastern half of the United States. The area of known distribution is roughly bounded by the following places where the species has been taken: Augusta, Maine; Norfolk, Va.; Decatur, Ala.; Yazoo City, Miss.; Lawrence, Kans.; and Brandon, Minn. (C. W. Collins, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

SMALLER EUROPEAN ELM BARK BEETLE

The smaller European elm bark beetle (Scolytus multistriatus Marsh.) is considered the most important insect vector of the Dutch elm disease fungus in the United States. Until 1936 the insect was known to occur in two distinct areas. One covered parts of eastern Massachusetts and southeastern New Hampshire. The other included parts of western Connecticut, southeastern New York, eastern Pennsylvania, northern Delaware, and northern New Jersey. In 1936 scouts connected with the Bureau's Dutch elm disease eradication unit found the insect at Parkersburg, W. Va. Since then that unit and the Morristown, N. J., laboratory have cooperated in getting additional information concerning the distribution of the species. It has been found to be well established in a large contiguous territory including parts of West Virginia, Ohio, Indiana, and Kentucky bordering on the Ohio River from East Liverpool, Ohio, to Evansville, Ind. The known infested area lies mostly in Ohio and West Virginia. At some points in Ohio it extends back from the river for approximately 50 miles and at some points in West Virginia for approximately 60 miles. Two other infested areas have been found. One is about 225 square miles in extent and lies just south of Pittsburg, Pa. The other area includes six localities where the beetle has been found in the vicinity of Martinsburg, W. Va. Five of these localities are in West Virginia and one is in Maryland. The attached map shows the known distribution of S. multistriatus and the Dutch elm disease. (C. W. Collins, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

EASTERN SPRUCE BEETLE

The eastern spruce beetle has continued its ravages in 1937 causing heavy mortality in overmature spruce on large areas in the Green Mountains of Vermont and the Adirondacks in New York, where outbreaks apparently have been in progress for the last several years. Salvage operations are being carried on in some of the infested areas in the Green Mountains. (R. C. Brown, Bureau of Entomology and Plant Quarantine, U. S. D. A.)



SOUTHERN PINE BEETLE

Rather severe outbreaks of the southern pine beetle occurred in several localities in southeastern Virginia in 1937. Considerable loblolly pine of merchantable size was killed in the vicinity of West Point, Va. Local outbreaks were also reported along the Eastern Shore of Maryland. Brought in 1936, which lowered the vitality of the trees, was probably the important factor aiding the increase of this species. (R. A. St. George, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BLACK HILLS BEETLE

In the Central Rocky Mountain region the serious outbreak of the Black Hills beetle increased considerably over 1936 in areas where no control was carried on. It is estimated that in south-central Wyoming some 210,000 limber pine and lodgepole pine are infested. In Colorado, in an area extending along the eastern range of the Rockies from the northern to the central part of the State, fall surveys indicated that 41,000 ponderosa pine were infested during the current flight of this beetle. The epidemic in southern Utah has been greatly reduced by control operations during the last two seasons; however, about 4,000 infested ponderosa pine were found in known epidemic areas. (J. A. Beal, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

MOUNTAIN PINE BEETLE

In the Pacific Coast States the mountain pine beetle was in an endemic stage during 1937. In northern Idaho, in stands of western white pine, only four small epidemic areas were found, necessitating the treating of 4,000 infested trees. In stands of white bark pine, which occurs at high elevations, the beetle continued to cause severe damage throughout the northern Rocky Mountain region. However, the great epidemic which in recent years spread through the lodgepole stands of Idaho and southwestern Montana has materially decreased. Toward the eastern edge of its range, southeast of Yellowstone Park and in north-central Wyoming, the beetle continued to be very destructive and killed several hundred thousand trees over a large area. Here again a very high percentage of the trees infested were either white-bark pine or a closely related species, limber pine. (Division of Forest Insect Investigations, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

WESTERN PINE BEETLE

Extensive surveys in Oregon and Washington, covering 8,600,000 acres during the summer, indicated that attacks by the western pine beetle had declined during 1937. Most areas carried endemic infesta-

tions of from 25 to 50 infested ponderosa pine per section, but a few areas showed losses as high as 100 trees per section. In California similar surveys indicated that the decline of infestation trends which appeared in 1935 and 1936 is now leveling out and by late fall a tendency toward an increase was noted in some areas. A severe cold spell in January 1937 killed about the same proportion of western pine beetle broods in northeastern California as the freeze of December 1932; however, the recovery of populations has not been so rapid this year. In the Northern Rocky Mountain region the beetle remained in an endemic status. (Division of Forest Insect Investigations, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

DOUGLAS FIR BEETLE

Epidemics of Dendroctonus pseudotsugae Hopk. continued in the scattered stands of Douglas fir in many areas throughout the entire Rocky Mountain region. In some of the worst infested areas 50 percent or more of the stand has been destroyed. In Oregon this beetle continued in an endemic status in the vicinity of the great Tillamook Burn, where in 1935 it increased to alarming proportions. (Division of Forest Insect Investigations, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

ENGELMANN SPRUCE BEETLE

A severe outbreak of the Engelmann spruce beetle is present in the northwestern part of Yellowstone National Park. During the past few years a large percentage of the spruce trees above 10 inches in diameter have been killed. In western Montana, on the Kootenai and Gallatin National Forests, spruce stands have also been found to be infested with this beetle. (J. C. Evenden, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BALSAM BARK BEETLE

Dryocoetes confusus Sw. continued to kill large quantities of alpine fir in the central Rocky Mountain region, as it has been doing for the last few years. (J. A. Beal, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

MOUNTAIN ASH SAWFLY

This European sawfly, Pristiphora geniculata Htg., which attacks mountain ash, was quite generally abundant in 1937 wherever its food plant is common in New England and New York. The defoliation was noted as particularly heavy on the trees growing on the higher elevations in Maine, New Hampshire, and Vermont. (R. C. Brown, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

A PINE SAWFLY

Serious local outbreaks of a sawfly, Neodiprion sp., in a few red pine plantations in Middlesex County, Mass., attracted attention in 1935 and 1936. In 1937 severe infestations occurred in one natural stand and several plantations of red pine in Middlesex and Worcester Counties, Mass. Heavy defoliation was prevented in most of the plantations by timely spraying. Most of the eggs are deposited in the needles of the red pine in October, and it has been recently observed that in some localities where no insecticides had been applied in 1937 the egg deposit is heavy. This indicates that it is a potential menace to red pine in these localities for 1938. (R. C. Brown, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

A SAWFLY

A sawfly, Neodiprion sertifer Geoff., apparently was introduced into New Jersey from Europe prior to 1925 but has only recently been identified. Because this species is a serious pest of pine in Europe an extensive survey was made in the spring of 1937 through the area surrounding the locality where it was first collected in 1925. Infestations were found in 22 localities scattered through Hunterdon, Mercer, Middlesex, Somerset, and Union Counties, N. J. The scarcity of pine plantations and the infrequent use of hard pines as ornamentals in these counties undoubtedly have been factors in limiting the dispersion of this pest. Pinus montana (Swiss mountain pine), and the variety mughus, P. sylvestris (Scotch pine), and P. densiflora (Japanese red pine) seemed to be most heavily attacked, but P. resinosa (red pine) and P. austriaca (Austrian pine) were also commonly attacked, though apparently to a lesser degree.

A note in the Bureau of Entomology and Plant Quarantine News Letter for September 1937 (Vol. 4, No. 11, p. 31, Nov. 1, 1937) records the identifications of adults of this species taken on Pinus mughus at Sidney, Ohio. (R. C. Brown, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

EUROPEAN SPRUCE SAWFLY

A tremendous increase in the abundance of the European Spruce Sawfly occurred in New England in 1937. Heavy infestations occurred in several localities in northern Maine, on Mount Monadnock, N. H., and at Wilmington and Lincoln, Vt. In 1937 the spruce on approximately 30,000 acres showed noticeable defoliation and some tree mortality has occurred in northern Maine. A large population of cocoons is now present in the heavily infested areas and a heavy attack over a much larger acreage is probable in 1938. Larvae and

cocoons were found in two localities in Somerset County, N. J., in June, but defoliation was scarcely noticeable. (R. C. Brown, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

LARCH SAWFLY

The larch sawfly, a common eastern species, was recorded in outbreak form on the north fork of the Flathead River in western Montana about 3 years ago. This epidemic does not appear to be increasing in severity, though the insect is still present and is doing some damage in small areas. Oviposition scars indicate that it has been present in some areas for several years without causing serious damage, and it is possible that conditions in Montana are not favorable for its development. In northern Minnesota the sawfly is at its lowest stage in many years, having practically disappeared in many localities. This reduction apparently was largely due to the extreme heat and drought of 1936, causing an exceptionally heavy mortality to the larvae before they matured. (Division of Forest Insect Investigations, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

FOREST TENT CATERPILLAR

In the Northeast severe outbreaks of the forest tent caterpillar were very noticeable in many localities. Heavy defoliation was observed on thousands of acres of forests in Maine, Vermont, and New York, and in more limited areas in New Hampshire, western Massachusetts, and northwestern Connecticut. In parts of Vermont many sugar maple orchards were severely attacked, as well as large areas of forests, although the degree of defoliation in general was not as high as in 1936. A survey of plots in Vermont indicated that the 1937 egg deposit averaged about 20 percent lower than in 1936. However, in some sugar maple orchards there is an increase in egg clusters, and in general the insect can be considered a potential menace for 1938. In northern Minnesota the outbreak covered some 5,000,000 acres of forest land. In general there was a decline in the severity of the 1937 infestation as compared to the severe epidemic in 1936. Greatest reductions occurred in the oldest centers of heavy infestation. In recently infested areas there will probably be a considerable increase in caterpillar populations in 1938. (Division of Forest Insect Investigations, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

SPRUCE BUDWORM

In central Colorado the spruce budworm was found to be causing excessive damage to ponderosa pine in several areas. This is probably the first record of serious injury in pure stands of

ponderosa pine. On this host the larvae bore through the bundle sheath and feed on the base of the developing needles. The adults proved to be one of many color phases of Cacoecia fumiferana (Clem.). In several other infested areas in the central Rocky Mountain region this insect appeared to be on the increase on the true firs and on Douglas fir. In Cody Canyon, in western Wyoming, there was a marked decline in the epidemic, which has continued there for a number of years on Douglas fir. In northern Minnesota and upper Michigan the form of the spruce budworm attacking jack pine caused less damage in 1937 than in 1936, although there was a continued spread of infested areas. (Division of Forest Insect Investigations, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

PANDORA MOTH

An extensive outbreak of Coloradia pandora Blake was discovered this year in central Colorado, on the Arapaho National Forest, where lodgepole pine is being attacked and an area several miles in extent is already heavily defoliated. Apparently it has been many years since this species has occurred in an epidemic stage in Colorado. (J. A. Beal, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

WHITE FIR TUSSOCK MOTH

Epidemic outbreaks of Hemerocampa oslari Barnes occurred in the Inyo and Mono National Forests, central California, in 1936 and caused considerable defoliation of white fir east of the Sierra Nevada Mountains. This outbreak continued with similar intensity in 1937. The outbreak is of unusual interest, because no noticeable epidemics of this insect have been reported in the California region since 1906. (J. M. Miller, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

DOUGLAS FIR TUSSOCK MOTH

An outbreak of Hemerocampa pseudotsugae McD. near Hailey, Idaho, on the Sawtooth National Forest, which was recorded in 1936, increased in severity and size in 1937. A large percentage of the defoliated Douglas fir died during the season. An effort was made to establish colonies of Compsilura concinnata Meig. and Ephialtes examiner F., which was shipped from the New Haven, Conn., laboratory in July. (J. C. Evenden, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

WHITE FIR LOOPER

During 1937 outbreaks of Ellopiia fiscellaria lugubrosa Hlst. appeared throughout all of the northern Idaho and western Montana forests. This is the first available record of the insect appearing in epidemic form in this particular region. In 1936 moths appeared

in sufficient numbers to cause comment, though defoliation was not especially heavy. However, in 1937 thousands of acres of white fir and associated tree species were severely defoliated, and late in the season the adults appeared in tremendous numbers. (J. C. Evenden, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

ORIENTAL MOTH

The population of the oriental moth has definitely increased over 1936 in 5 of the 17 observation points located in Boston, Mass., and nearby suburban towns. The greatest increases are in Cambridge and Winthrop, and to a lesser degree in Revere and in two sections of Dorchester. In the other 12 observation points the conditions are similar to those of 1936. Although the cocoons of this insect are very abundant on shade and fruit trees in some localities, the heavy infestations in general are extremely local. Very little serious defoliation was caused by this insect last summer. Several hundred cocoons were recently collected and the prepupal larvae dissected. The results showed a decided general increase in parasitization by the introduced parasite Chaetexorista javana B. & B. (R. C. Brown, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

LARCH CASEBEARER

The larch casebearer continues as a serious menace to larch in the northeastern part of the United States. In 1937 larch trees all through the Adirondack section of New York showed a severe browning by this miner. In New England the mined needles were very noticeable in nearly every stand of larch, although in general the 1937 infestation seemed to be somewhat lessened in intensity from that of the last several years. Tree mortality has been rather high in some of the sample plots. (R. C. Brown, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

LODGEPOLE NEEDLE MINER

Recurvaria milleri Busck was in flight in the high Sierra areas of central California during July of 1937 and appeared in great numbers in the local areas where it has been developing in epidemic proportions since 1933. There was evidence of a slow spread from some of the areas where the infestation had reached its greatest intensity; in a few other areas where a high degree of parasitization was observed the outbreaks were apparently on the decline. (J. M. Miller, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

FIR BARK LOUSE

The fir bark louse increased in abundance in New England and New York in 1937, owing primarily to the wild weather last winter. Dead trees were more common this fall in Maine and New Hampshire than in 1936. In New York scouting has revealed a larger area of infestation extending south into the Catskill Mountains. Considerable mortality has occurred in the southern part of the Adirondack Mountains. Infested trees were found in two localities in Somerset County, N. J., in June 1937. (R. C. Brown, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BEECH SCALE

A survey of sample plots in Maine indicates that there has been a definite increase in the infestation of the beech scale. In many instances the infestation was medium to heavy near the base of the trees in 1936 but at present it extends to distances of 25 to 50 feet from the ground. No marked increase in mortality of trees over 1936 was observed. The predator Chilocorus bivulnerus Muls. is apparently unable to check the progress of the infestation in Maine. The infestation in Scarsdale, N. Y., is now rather light. Chilocorus has been abundant here and apparently its feeding on the scale contributed largely to the checking of this particular infestation. (R. C. Brown, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

LOCUST LEAF MINER

The locust leaf miner was more abundant than usual in the Appalachian Mountains from Pennsylvania southward to North Carolina and Tennessee. There was a general browning of locust leaves and some forests looked as if they had been scorched by fire.

CATALPA SPHINX

The catalpa sphinx appeared in great abundance in the Ohio Valley from Illinois and western Kentucky and Tennessee to Pennsylvania, and on the eastern side of the Appalachian Mountains from New Jersey to South Carolina. Catalpa trees generally were defoliated. Late in the summer the parasite Apanteles congregatus (Say) became very noticeable over much of the infested territory. One report of injury was received from northern Mississippi.

BOXELDER BUG

The boxelder bug was first noted in the State of New Jersey by the writer in the fall of 1936, when it was reported as numerous in and about a house in Haddon Heights. A very large number of the

insects were seen in Haddonfield in yards having large boxelder trees. The owners stated that the bugs had been bothersome for the last 3 years. Determination was verified by H. G. Barber from specimens collected in this locality December 1936. (L. J. Bottimer, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

SCREWORM

In Texas the screwworm overwintered from the south edge of the escarpment between Devil's River, in Val Verde County, and D'Hanis, Medina County, and southward. Migration from this area began in March and by July 18 had reached a line from Oklahoma City to Amarillo, Tex., and Tucumcari, N. Mex. Dispersion eastward reached western Louisiana about July 1 and north-central Louisiana about August 15. The dispersion northward was slightly slower than last year, but slightly more rapid to the east. These migrations were rather uniformly progressive until the first of August, when the hot, dry weather to the north apparently stopped migration, as did the rather excessive rainfall in eastern Texas and Louisiana in August, September, and October. The build-up of populations began in the southernmost extremity of Texas and apparently reached peak at San Perlita, Willacy County, in the latter half of April. In the west Gulf plains area the peak was reached in the latter half of April and in the east Gulf plains area in the first half of July. Along the Lower Escarpment the peak was reached about the first half of July at Sanderson. Along the Upper Escarpment the peak was reached during the latter half of July at Sheffield. In the upper Gulf plains area and along the escarpment there was a decrease in the fly population in August, when there was no rainfall and the temperatures were abnormally high. A second peak was reached in September and October.

Comparing the population of screwworms in Texas this year with that of last year, the status trap at Uvalde indicated that in 1937 the catches amounted to 58 percent as many flies as 1936 and approximately 20 percent as many as in 1935. Activity ceased on November 18 at Uvalde, one month earlier than normal, on account of an abnormally cold period. In Arizona laboratory tests indicate that the insect did not overwinter at Tempe, and survey-trapping tests indicate that the fly was killed out in Arizona and evidently from 100 to 150 miles into Mexico. As indicated by standard trap catches and scouting for infested cases, the first fly appeared in the trap at Pozo Blanco on May 10. At approximately the same time or shortly afterwards the fly appeared in the eastern part of the area, along the Arizona-Mexico line to New Mexico. Migrations from these infestations were rather slow during the season and it is indicated that the fly did not reach the

escarpment along the Gila and Salt Rivers until late and did not pass the Divide into Little Colorado area during the season. The incidence of livestock infestations in Arizona was very much lighter than in 1936. (D. C. Parman, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

A very mild winter afforded screwworms a long season of activity in the Southeastern States. The lowest incidence of the pest occurred in Florida and Georgia during the last week of December and after that time it continued activity. The infestation in Georgia involved approximately the area in the southeastern part of that State, from a line drawn from Early to Washington Counties. Examinations of animals in counties north and east of the area known to be infested did not reveal new infestations except in one instance, when larvae were obtained in Fulton County on November 12. The infested area during the year in South Carolina comprised the southeastern quarter of the State, included within lines drawn from Barnwell to Sumter County and thence to Berkeley County. A widespread population in Florida was encountered early in the year. The lowest incidence occurred in December 1936 and in the following January 3,213 cases were reported from 54 counties, from Lafayette, Columbia, Union, and Hamilton Counties in the north as far south as Lee and Glades Counties. During the last two weeks of October, 1937, it was estimated that 40 cases of screwworms occurred in Houston County, Ala., near the Georgia boundary line. This county, as well as four other counties in the southeastern corner of the State, were scouted, but no further infestations were found.

STABLEFLY

Stableflies became seriously abundant in several States, notably in Iowa, Missouri, and Kansas.

In Mississippi stableflies were reported as moderately abundant throughout the winter of 1936-37 and more abundant in Washington County on April 15, 1937. By the middle of April they had begun to annoy cattle at Valdosta, Ga., and at Dallas, Tex. They became active in the central part of Iowa the last week in May. During the latter part of June they became seriously abundant in Kansas, in the central part of Missouri, and in Iowa, while in the eastern part of Nebraska cattle and horses were huddling in pastures for protection.

In central Iowa observations made by S. W. Simmons on 37 farms from June 28 to July 13 showed a serious abundance of stableflies, interfering greatly with farm operations. Mules, attacked more than

horses, could not be worked at times. Many farmers sprayed their horses three or four times a day and some carried sprayers into the fields with them.

In Missouri and Iowa the abundance continued through July. The pest was reported troublesome at Ocean City, Md., on July 28 and abundant in Kansas on June 26.

In south-central Kansas, H. O. Schroeder, reporting for the period July 23 to August 22, described the outbreak as the heaviest in 15 years. Horses and cattle became exhausted. Calves suffered open wounds at the joints of the legs and had raw areas along their backs. During the day many farmers protected their horses in darkened barns. Horses were worked with great difficulty, even while protected with nets and burlap. This extreme abundance followed a period of unusually heavy rainfall, from July 10 to 20.

Reports from Missouri and Iowa indicate some decline in abundance in August, followed by an increase in September. In Kossuth County, Iowa, on September 10, cattle in 10 or 15 pastures observed were huddling at the north fences for relief from stable-flies, relief being afforded by a strong, cool wind from the north. After September 16 the numbers in Iowa declined rapidly. (R. H. Wells, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BOTTLES

In the central part of Iowa all three species of horse bots, Gastrophilus nasalis L., G. haemorrhoidalis L., and G. intestinalis Deg., were much less abundant than during any of the preceding 4 years. The scarcity of G. nasalis and G. haemorrhoidalis was especially notable. G. intestinalis was reported active in Willacy County, Tex., on March 23; at Ames, Iowa, not until June 21; still active at Uvalde, Tex., on October 18; whereas, prior to 1936, they had been practically absent for several years. G. nasalis was reported active in Willacy County, Tex., on March 22; at Ames, Iowa, on June 10 and October 18; at Virginia Dale, Colo., on July 4; at Uvalde, Tex., on October 18. G. haemorrhoidalis was remarkably scarce all through the season in central Iowa. The species was reported active in Larimer County, Colo., on July 3. (R. H. Wells, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BROWN DOG TICK

More than the usual number of reports of occurrence of the brown dog tick were received during the year. Reports were received from Denver, Colo., New Haven, Conn., Waukegan, Ill., Townson, Md., and Douglas County, Nebr.

BROWN-BANDED COCKROACH

The brown-banded cockroach (Supella supellectilium Serv.) is now so definitely established in the United States that it should no longer be omitted from our economic literature. In recent publications 1/, 2/ the pest is illustrated and compared with other species. E. D. Ball wrote recently that S. supellectilium had been established in Tucson, Ariz., for about 3 years and that he had sent specimens to M. Hebard, who states 3/ that these specimens are the first from the Southwestern States to be received by him. In his letter Dr. Ball also states that this cockroach has been taken since 1935 in Arizona at Phoenix, San Carlos Indian Reservation, Bisbee, and Douglas and that a correspondent stated that it is the only cockroach he has not been able to successfully handle in the house.

A commercial exterminator company in Atlanta, Ga., wrote in December, 1937, that an infestation was found in a house in Athens, Ga. G. E. Gould reported the species found in October 1937 at Bloomington, Ind.

In December 1937, K. Cook reported combating an infestation in Worcester, Mass. J. J. Davis reports having received specimens from a pest-control operator in Denver, Colo., in October 1937. F. E. Cairns, Mazomanie, Wis., sent specimens on April 20, 1937, from his home to C. L. Fluke at Wisconsin State University, where they were identified as this species by H. C. Severin. In further correspondence with Mr. Fluke, it was learned that the infestation was very active and that in recent years Mr. Cairns' family had made a trip to Texas and the Gulf.

On November 6, 1937, J. L. Calhoun, San Angelo, Tex., wrote that this roach is a serious pest in homes at that place and sent a large collection of specimens in alcohol. He wrote on November 26, 1937, that this roach is never seen in his home except in the kitchen, where it likes to hide about the sink and in pot-and-pan cabinets. In other houses it infests various rooms congregating in upholstered and other furniture in the daytime. The San Carlos Agency, San Carlos, Ariz., sent specimens to the Office of Indian Affairs, United States Department of Interior, with the statement that during 1937 this species was becoming a great pest at the Indian Agency.

To date Supella supellectilium has been recorded from the following places: Florida--Key West (1903), Miami (1903), Daytona Beach (1936), Jacksonville (1936); Georgia--Savannah (1936), Atlanta (1932-37), Athens (1937); Alabama--Auburn (1934), Birmingham (1936-37);

1/ E. A. Back, Proc. Ent. Soc. Wash., vol. 39, pp. 205-213, November 1937.

2/ E. A. Back, U. S. Dept. Agr. Leaflet 144, 6 pp., 1937

3/ M. Hebard, Trans. Amer. Ent. Soc. vol. 61, p. 273, September 1935.

Mississippi--Cleveland (1937); Louisiana--Shreveport (1935); Texas--Austin (1931), Dallas (1937), Houston (1937), San Angelo (1931-37), San Antonio (1927); Arizona--Tucson (1935-37); San Carlos Indian Reservation (1937); Fisbee (1937); Phoenix (1937); Douglas (1937); Oklahoma--Ada (1937), Tulsa (1937), Oklahoma City (1937); Wisconsin--Mazomanie (1937); Missouri--Kansas City (1937); Nebraska (1929); Illinois--Urbana (1933), Chicago (1937); Indiana--Bloomington (1937), Indianapolis (1937); Massachusetts--Worcester (1937).

As this roach has such a wide distribution throughout the South and has demonstrated its ability to survive and multiply in northern cities and towns, new distribution records may be expected to increase rapidly. Cockroaches are so easily concealed in household effects and baggage carried quickly in automobiles from the South to the North that all entomologists and pest-control operators should combine efforts to obtain the proper identification of all cockroach adults that do not exceed 5/8 inch in length and possess wings with two light-brown or yellowish cross bands. Blatella germanica L. is the only roach in the United States that is likely to be confused with this species. (E. A. Back, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

Corrections.--The identification of the mite published as Tetranychus telarius L., in the Insect Pest Survey Bulletin, vol. 17, p. 284, 1937, has been changed to T. pacificus McG.

The rabbit tick (Haemaphysalis leporis-palustris Pack.), reported by M. H. Swenk, in vol. 17, p. 424, has been changed to the brown dog tick (Rhipicephalus sanguineus Latr.).

The spruce budworm (Cacoecia fumiferana Clem.), reported by L. H. Noble, in vol. 17, p. 417, has since been identified as Diprion polytomum Htg.

The identification of the sawfly, reported as Hemichroa pacifica Rohw. (vol. 17, p. 413) was in error. The insect is H. washingtonia Rohw. and Midd. There is no H. pacifica.

The report on cowpea weevils by Z. P. Metcalf (vol. 17, p. 49) published as Chalcodermus aeneus Boh., should be Callosobruchus maculatus F.

An error in a note published in vol. 16, p. 376, 1936, has come to our attention. The note on Tarsonemus floricolus C. and F., credited to F. F. Smith, should have been credited to A. C. Davis.